

## Chapter 5

### Operating Mechanism of Seed Industry in Bhutan

This chapter describes the seed industry development and contract seed potato production system and its operating mechanism in Bhutan. To get better understanding of the system local seed production and exchange system, seed program during BNPP era, and seed program under the DSC are described. To strengthen seed systems a comprehensive understanding of the seed systems practiced by the farmers is of paramount importance. Farmers, particularly the small farmers, are involved in several kinds of seed systems, which help them to produce and obtain the seed. These systems can be broadly divided into two types: a formal seed system and a local system. The local system is also sometimes called the “informal,” “traditional,” or “farmer” seed system.

#### 5.1 Introduction

The rapid growth of agriculture is essential not only to achieve self-reliance at the national level but also for the household food security and to bring about equity in the distribution of income and wealth resulting in reduction in poverty level. To make this aspiration a reality, the supply of quality seeds and plants of modern varieties for attaining higher crop yield and farm productivity is inevitable.

The best way to ensure that farmers start their new cropping season with the highest potential for success is obviously the use of good quality seeds and plants. The fact is that the seeds and plants are not just the planting materials but the carriers of vigorous genetic potential. Good production can be achieved by replacing farmers' seeds with good quality seeds of improved varieties on a regular basis. The good quality seeds not only bring about sustained growth in farm production but also stimulate the adoption of new production methods and use of yield enhancing Argon-inputs. But an efficient seed system is imperative to enhance Seed Replacement Rate (SRR) for which seed sector will have to play a major role.

### 5.1.2 Seed industry development

The Seed sector development in Bhutan took place rather very recently unlike in the neighboring countries of the region. Prior to 1984, though, there was a government program for the production and supply of seeds; it was found to be very unsatisfactory and did not bring the expected results in increasing crop yields. Considering the past experience, and having realized the crucial importance of seed industry development to agricultural development, the Royal Government of Bhutan (RGOB) initiated a centralized government seed program in 1984 and the National Seed and Plant Production Program (NASEPP) was founded in the Department of Agriculture (DOA). Initially NASEPP procured seeds from the neighboring India and supplied to farmers. Since crop research was also at its initial stage of development, Bhutan had to depend on whatever varieties available in India.

NASEPP was a centralized program under the DOA and a non-profit-making organization and attempts to supply quality seeds of improved crop varieties to farmers at a reasonably low cost considering the subsistence nature of Bhutanese farmers. Hence the farmers enjoy a hidden subsidy on seeds where the seed price does not include the cost of overheads, processing, storage and handling, etc.

While NASEPP was responsible for the production and supply of all agricultural seeds and planting materials, a separate program, Bhutan National Potato Program (BNPP), looked after seed potato production and supply. The pasture/fodder seed production and supply was the responsibility of the Department of Animal Husbandry (DOAH) and the forestry seed production and supply was by the Department of Forestry (DOF).

The NASEPP was converted to DSC Corporation (DSC) in 1995 and is mandated to produce and supply the quality seeds and planting material to the Bhutanese farmers at affordable price

Over the past 20 years both DSC and the crop research sector of the DOA has developed substantially and now the DSC produces almost the entire seed need of all major crops of the country. Still the use of certified seeds in Bhutan is low and the DOA is trying its best to educate farmers through the Extension Division on the benefits of using certified seeds.

The national policy on agriculture seeks to actualize accelerated growth on production, agro-business, creates employment in the rural areas, secure a fair standard of living for the farmers, and discourage rural-urban migration. To realize these policy objectives, the use of quality seeds and plants of improved varieties, sustainable production technology, conservation and efficient use of agricultural resources and participation of farmers and private entrepreneurs in agri-business are essential.

### **5.1.3 Government policy towards the seed sector development**

Self-reliance and sustainability is the overall objective of the government towards agricultural development and hence the government gives significant importance for the seed sector development. The Royal Government of Bhutan (RGoB) has been providing all necessary support for the development of the seed sector through development plans (Five-Years Plan) periods.

### **5.2 Local seed system**

In a local seed system, activities tend to be integrated and locally organized, which embraces most of the other ways in which farmers themselves produce, disseminate, and access seed directly from their own harvest; through exchange and barter among friends, neighbors, and relatives and through local markets. Encompassing a wider range of seed system variations, what characterizes the local system most is its flexibility. Varieties may be landraces or mixed races and may be heterogeneous (modified through breeding and use).

About 80% of the seed potato demand in Bhutan is met through the informal system (Tshering and Domang, 2004). Farmers' first option is to save their own seed. Many farmers save their own seed either in bulk or in jute bags in the houses. This is practical since majority of the potato growers are located in places above 2,000 m, where there are fewer problems of virus. The second option is to exchange seed with friends and neighbours. The third option is to buy from the informal seed merchants from weekly markets, the volume of which is negligible.

In the traditional system that predominates in the country, farmers select at harvest some tubers from the bulk for planting in the following season. Sometimes the tubers used as "seed" are just the tubers that remain in the store. The quality of seed is variable but it is usually poor. It is believed that potato crops maintained at high altitudes in Bhutan are good quality and produce acceptable good quality seed. This is probably correct but no one has proven this hypothesis. At high altitudes, the disease transmitted by aphids, even if it may be low, still occur and can accumulate over time. The increased sources of inoculums and the disease dissemination will be accelerated when no fresh and clean material is incorporated into the system. This is what is happening at the moment in potato industry in Bhutan. Rapid corrective measures are required to restore the natural equilibrium in the maintenance of the good quality seed by using the advantage of the high altitude.

### **5.3 Bhutan national potato program era**

Modern potato varieties introduced in the late sixties and early seventies were first multiplied in Government farms (Nangsepyel and Kanglung) by projects (Gogona and RDP Bumthang). The Rural Development Project Bumthang initiated the first seed multiplication program with contract farmers in 1980. Methods used for seed multiplication in the seventies and early eighties were simple, cheap but effective using clonal selection and the opportunities of the specific conditions of high elevations. Gradually the systems became more sophisticated when Bhutan National Potato Program (BNPP) took up the potato program in 1983 (Roder 2004). The in vitro micro-propagation method was used for the production of mini-tubers by BNPP

at Yusipang Research Center and the mini tubers were taken to Phobjikha for basic/foundation seed multiplication. The basic seed were supplied to the Dzongkhag contract growers at Phobjikha, Sephu, Bumthang and Tashigang for further multiplication of certified seed.

The National Potato Program, being aware of the importance of high quality seed, promoted different approaches to increase the availability of good quality seed. In the early 1980s, a farmer-contract seed system was initiated with the support of the Swiss Agency for Development and Cooperation (SDC). Individual farmers were contracted to produce seed under the direct supervision of project staff and these farmers were responsible for maintaining certain quality standards. This contract system proved to be time-consuming, costly, and more importantly, unsustainable, because it required a large number of well-trained personnel, substantial logistics, and external funds.

Beginning from 1994, the contract system gradually phased out in eastern Bhutan. It was replaced by Seed Potato Grower Groups (SPGGs) affiliated to Farmers Association Support Unit (FASU) on the pilot basis. Initially there were five seed potato grower groups and the groups were mandated to buy the basic seed from NASEPP at every three years interval to maintain the seed quality. The seed production program was implemented through this group approach in the Eastern Bhutan to cater the eastern region and to cater central and western region the activities of potato was handed over to National Seed and Plants Program (DSC) when BNPP project ended in 1994.

#### **5.4 Seed potato grower groups (SPGG)**

In line with the Government decision and the broad policy guideline to encourage formation of farmers group and association, BNPP initiated seed potato grower groups in eastern Bhutan in 1994. The former contract seed growers of BNPP joined the group for the production of quality seed potato to meet the farmers' demand of eastern Bhutan.

## 5.5 Druk seed corporation

DSC is a quasi corporation<sup>1</sup>, which is an undertaking of the Ministry of Agriculture. DSC is mandated to firstly function as the national seed grid and meet the in-country demand of certified seeds and plants of recommended and released varieties, and fertilizers at a price affordable to the Bhutanese farmers to support agriculture and horticulture development (DSC, 2003).

DSC functions as the National Seed Grid of the country by coordinating and facilitating Contract Seed Growers (CSGs), Private Nursery Growers (PNGs), Commission Agents (CAs) and private sector organizations to ensure the availability of certified seeds and plants to the Bhutanese farmers. While it maintains and produces quality seed, it is also mandated to ensure timely supply of planting materials to growers. As a corporation, to generate and attain greater financial self-reliance, DSC is expected to explore export market of seeds and planting materials.

### 5.5.1 Varietals release and plant variety protection

The mandate to identify new plant variety is entrusted to the Council for Renewable Natural Resources Research of Bhutan (CORRB) of the MoA. The National Seed Board (NSB) of the MoA releases the new plant varieties confirming the Value for Cultivation and Use (VCU). For the plant varieties released by the NSB, both public and private sector seed enterprises have free access to breeder seeds. However, any commercially oriented entrepreneur has the opportunity to apply for the release of new plant variety based on the evidence on its VCU and best acceptance by seed-end-users.

The NSB of the MoA upon confirming the VCU releases new plant varieties within the framework of the Seed Act of Bhutan-2000. The Seed Act of Bhutan-2000

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<sup>1</sup> The management board, under the chairmanship of the Minister for Agriculture, is responsible for the overall supervision and control. The corporate policy of 1995 (CP-1995), the Financial Manual 1998 and the directives of the management board enable DSC in planning, management and overall control of its operations (DSC 2003).

requires compulsory certification of seeds and plants placed in the market. Thus, in one hand the National Biodiversity Act-2003 protects the “Products” while the Seed Act of Bhutan-2000 protects the “Consumers” on the other hand. Within the scope of these Acts, the DSC delivers the products (seeds and plants) to the consumers (farmers) while Bhutan Agriculture and Food Regulatory Authority (BAFRA) of the MoA protect the consumers’ interest.

### 5.5.2 Maintenance breeding (MB<sup>1</sup>)

The maintenance breeding implies to maintain the new plant variety in its original genetic composition. It is maintained in the form of pre-basic seeds and elite progeny orchards or in *in-vitro*. In seeds, the number of cycles of reproduction between pre-basic and certified seeds, and standards applied in each successive reproduction cycle determines as what % of yield potential of pre-basic seed is maintained in the certified seed.

In Bhutan, the CORRB and MoA has the mandate for maintenance breeding and make available the pre-basic seeds to DSC or any other private seed enterprise. Large seed companies can afford their own research and maintenance breeding, which are out of reach for small seed companies. Once the genetic make up is degenerated at pre-basic and earlier stages of multiplication, it will not be regained at certified seed stage. A necessity has been felt to argument the maintenance breeding capacity and maintains the flow of pre-determined quantity of pre-basic seed to ensure that seed enterprises are on sure traction.

### 5.5.3 Seed production

Success in seeds and plants production depends on skills and experience. Over the years the DSC learnt lesson that it needs seed technologist. Exporting seeds to earn revenues to cross subsidize the domestic sale was also felt very important but, the export market demands hybrid seeds and DSC do not have technical capacity to produce hybrid seeds, which is a highly specialized task.

Ideally, the DSC should concentrate on profitable enterprise based on assured technology with minimum degree of risk for its financial sustainability. But it has to cater to the need of every Bhutanese farmer. Besides, the DSC is mandated to meet the emergency demand of seeds. A private sector seed enterprise may not maintain buffer seed stock of all commodities unless otherwise economic gain is obvious. Therefore, while the DSC continue to meet the national development needs; the private sector seed enterprise may concentrate on profitable enterprise based on assured technology with minimum degree of risk.

In Bhutan, the challenge for a seed enterprise is to operate small farms on commercial scale. It must be clear that a seed industry invests money on technology that works i.e. seeds and plants of improved varieties, skill and experience, and marketing.

#### **5.5.4 Seed distribution and marketing**

The national seed distribution system is composed of a network of private Commission Agents (CAs) in other words the seed merchants. The CAs are identified and nominated by the dzongkhags adopting the guidelines formalized by the DSC. The specific guidelines for CAs for quality assurance are:

- The CAs sells the products of DSC intact in original container/packing.
- The CAs arranges safe storage and handling of DSC's products in such a manner that it is well protected against deterioration.
- The CAs ensures that the quality standards are enforced.

For success of seed industries, the price of seeds and plants should be affordable to the Bhutanese farmers in the first place. The farmers choose to grow certified seeds of modern varieties if the varieties are of their choice and readily available at an affordable price. However, often what is obvious to one is not obvious to another. The benefits of adopting and using the certified seeds of improved variety



may be obvious to the proponents but not to the farmers. On the other hand the barriers to adoption is apparent to the farmers but not to the proponents. Therefore, the seed industries have to invest in the market assessment, awareness campaign and market promotion.

In seed industry the demand forecasting is indeed a difficult task. The DSC is badly hit with the unsold stocks and receives insistent demands when stores are empty. Besides, the DSC has to maintain buffer stock of seeds as a security measure of national food policy for *ad-hoc* and emergency supplies to the areas of natural calamities.

#### **5.5.5 Quality assurance**

The quality control means the quality assurance and it is pre-requisite for DSC or any seed industry to gain confidence of consumers (farmers) and establish competitive edge in the seed market. While the Bhutan Agriculture and Food Regulatory Authority (BAFRA) have the mandate to certify the seeds and plants sold to the farmers or exported. Of late the National Seed Board (NSB) had issued crop standards and seed standards for the purpose of quality assurance of seeds and plants placed in the market.

#### **5.5.6 Measures to support domestic seed industry**

The experiences in the developing countries indicate that the government undertaking on certified seeds of conventional varieties of food crops is a losing proposition. The private entrepreneurs are likely to take up the production of high-value low-volume seeds particularly of vegetables and leave unprofitable high-volume low-value commodities to DSC.

Table 5.1: Financial performance of DSC.

Parameters	As at 31.12.97	As at 31.12.03	As at 31.12.04
-----Nu. in Millions-----			
Total Income	24.959	35.009	36.776
Total Expenditure	29.843	39.256	40.192
Profit/(Loss)	(4.884)	(4.247)	(3.416)
RGoB Grant	3.439	2.000	2.000

*Source: DSC, 2005.*

Ever since the inception of DSC, the issue of budgetary support to DSC is the most argued topic. The argument on government support to DSC needs to be understood that whether it is the support to DSC or it is for the farmers. If the support to DSC is withdrawn, it will have to recover the full cost of seeds and the increased price of seeds of food crops will negatively affect the food self-sufficiency objective. Since seed is the determinant of agriculture production potential, on which the efficiency of other agriculture inputs is dependent therefore support to seed sector seems very vital.

Since, DSC is running in to loss and to pay higher price for the seed produced by the contract growers will further exacerbate the financial situation of DSC. If, the price for the produce is not increased it will not be profitable for the growers to be contract growers so, the growers will definitely leave the contract system where they do not have any incentive. DSC in other hand needs to maintain its fixed assets which required huge amount of financial resources too. The only solution foreseen at the present moment is to provide inputs in credit to the growers which will help DSC to produce quality seed as; 80-85% of seed are produced through CSG.

### **5.5.7 Farm facilities**

The DSC has seven seed and plant production farms across the country show as in Table 5.2. These locations are designated as the DSC's regional centers. In these regional centers and production farms the DSC has some seed drying and processing

facilities but not the seed storage facility except at Paro. Most of these facilities are either too large for the current size of operation or not the kind of facility the DSC needs. The mismatch of the facility adds to the maintenance and operation costs. There has been a long-standing issue that vegetable seeds are brought to Paro for final processing, bagging, storage and marketing from all the regional centers and farms across the country. This practice of NASEPP era still continues adding operational cost to DSC.

Table 5.2: Farm wise actual and cultivable area.

Sl No	Farms	Altitude -----m-----	Area	
			Actual -----ha-----	Cultivable
1.	Jeuphu (Paro)	2,500	5.5	2.6
2.	Bondey (Paro)	2,200	3.3	1.3
3.	Bajo (Wangdue)	1,200	3.4	2.5
4.	Phubjikha (Wangdue)	3,000	16.6	10.0
5.	Bhur (Sarpang)	200	25.0	18.8
6.	Jachedpo (yangtse)	910	10.1	7.5
7.	Chinery	800	1.6	0.5
	Total		65.4	43.1

Source: DSC, 2004.

Less than 10% capacity of the tissue culture laboratory is used for maintaining potato germplasm and their multiplication. There is no assessment or plan as to how this facility could be more profitably utilized in the near future. The farms are small and responsible for the production of basic seeds.

### 5.6 Contract seed growers (CSGs)

The Contract Seed Growers (CSGs) have a contractual agreement with DSC. The CSGs receive the seed premium in lieu of the Certified Seed produced by them

on behalf of the DSC. The seed collection and marketing in this system is the responsibility of the DSC

### **5.6.1 Contract seed growers' scheme**

The CSGs are reluctant to work with DSC as the purchase prices are low and there is no insurance against the seed crop failure or in cases of rejection by the seed-certifying agency. The DSC will only be on its way to financial sustainability if CSGs are paid the premium price to their produce weighing comparative advantage against other alternatives. The policy decision should be taken at the earliest on the extent of premium taking all the factors into account (cost of production, opportunity lost, interest on investment, market price in the region, and the profit margin for the DSC taking into account its overhead and depreciation cost). In case of vegetables the benefit a farmer would derive from selling the vegetables must be considered and also the opportunity lost from vegetables crop harvest stage to seed harvest stage, which in many cases a second vegetables crop can be harvested.

The DSC should revise (upwards) the purchase prices of CSGs' produce in order to retain and attract CSGs. DSC should work out cost of production and get approval from Management Board (MB<sup>2</sup>) for fixing the price of seed. The CSG policy guidelines are adequately outlined in the Financial Manual (FM 1998). It is only the intuition and efforts of DSC that will take it forward.

### **5.6.2 Seed village scheme**

The manner in which the commodities and therefore the CSGs are spread across the country there is no possibility that DSC will have desired efficiency. The basic reasons for the inefficiency are the low cost-benefit in providing technical support, seed crop monitoring, seed collection, drying, processing, treating, packing and storage and eventually transportation and marketing. In order to bring about a desired efficiency in producing certified seeds and plants through CSGs, the DSC should adopt Seed Village Scheme (SVS). In this scheme, based on potentials and

willingness of the farmers, a cluster of farm households should be selected and registered with DSC as CSGs. When CSGs are in cluster for a particular commodity, it becomes easier to provide them the technical support and monitoring and purchase operations for DSC becomes cost efficient

### **5.7 Prospect for DSC**

The future prospects of DSC can be best understood by critically analyzing strength and weakness of DSC's present operating systems and alongside the threats that DSC has to encounter and the existing strengths for its success. The concept of SWOT analysis was employed to staffs in three DSC farms.

#### **Strengths**

Considering the long association of DSC with seed sector, it has established itself as an institution supporting seed sector. It has built necessary infrastructures, network and skills in seed sector development. The existence of highly mechanized seed processing plants, and skilled manpower are the prime strength of DSC to support seed sector. The regional farms equipped with basic facilities and land also acts as strength for DSC. The well-established linkage with regional (South Asian) and international seed agencies can form a strong point, which is essential to take the seed sector forward. As a new corporate agency, there is strong support from the government in ensuring its success.

#### **Weakness**

Alongside, there exist certain weakness, which could hold back the development of DSC and consequently the seed sector. The study revealed that weak professional and technical competency among DSC's staff to handle wide range of crops can be a critical weakness. The poor linkage with research, extension and Dzonkhag RNR programs is considered as a weakness of DSC. The management aspects in production and marketing seem one of the weaknesses for DSC.

## Opportunities

In view of the transforming DSC as corporate agency, there exist ample opportunities for making seed production a financially viable enterprise. For instance, the diversity of agro-ecological environments of the country offers excellent opportunity for seed production. At the same time, high domestic (Effective seed demand for potato is 816 mt annually) and export market potentials could greatly help financial self-sustainability of DSC. In view of the flexible and accommodative government policy on foreign investment provides the opportunity to DSC to explore the possibilities of entering into mutually benefiting joint venture with international seed companies.

## Threats

However, increasing cost of production, low quality of seeds and a tarnished image of DSC, growers leaving the contract seed production, competition from the Indian seed potato producers, higher price demand by the growers, lack of professional experience in managing a seed corporation and DSC has to maintain its fixed cost are some of the critical threats, which could hamper the seed sector development.

## 5.8 Seed potato production and distribution system

There is prescribed procedure for release of new crop varieties and technologies. As shown in Figure 5.1 research provides breeder seed of crops to DSC who is mandated to produce and maintain foundation (basic) seed and multiply certified seed for general sale. Seed potato production starts from *in-vitro* plantlets production at tissue culture laboratory at DSC, Paro. Thereafter, they are grown in the screen house and go through two years of seed multiplication (Foundation Seed I & II) at Phobjikha farm (26 ha). These foundation/basic seeds are then distributed to the

CSGs based in Bumthang, Phobjikha and Sephu, and the SPGGs in Kanglung for further multiplication to produce certified seeds<sup>2</sup>.

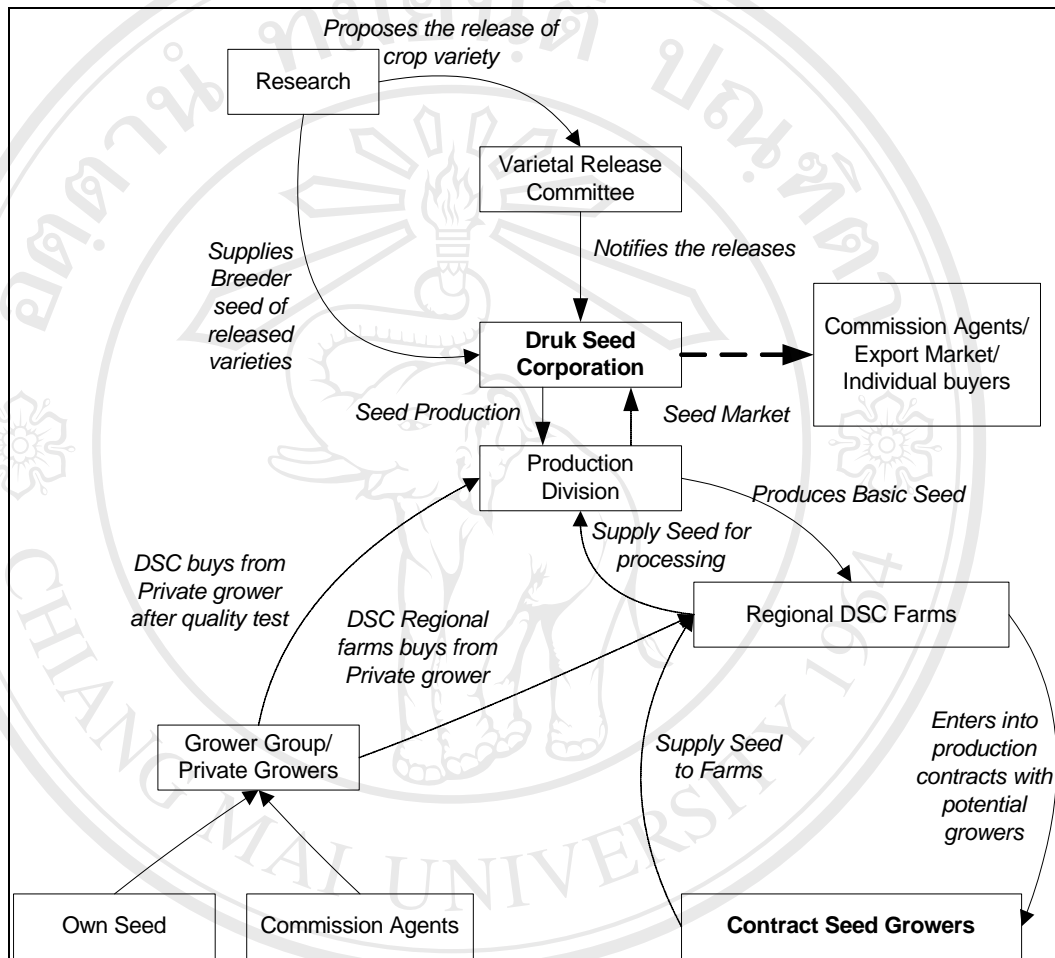


Figure 5.1: Schematic representation of Seed Potato production system.

As indicated in Figure 5.1 DSC contracts out production of certified seed to interested farmer in selected area. Under the annual contract agreement DSC is to distribute basic or foundation seeds (disease free and certified) to the CSGs every year to maintain the quality of seeds. The seed potato fields are regularly monitor and inspected by the DSC staff. When the inspectors certify the field the growers are allowed to harvest the seed potato. The growers will be provided with the standard

<sup>2</sup> Certified seed is the progeny of foundation seed or certified stage I & II seed. It is the ultimate output of seed production chain.

packing materials that are free of cost. The growers need to grade the tuber as per the seed size and before packing the produce will be inspected by DSC for the seed size and seed quality. Once it is certified by DSC the lot is weighed and the growers will pack and deliver the lot to near by road head from where it is the responsibility of DSC to transport to its store. Further, DSC monitors, and provides technical advices and trainings in seed potato production to the CSGs. The seed is marketed through CAs. Some quantities of seed potato are exported to India through Food Corporation of Bhutan (FCB).

The average quantity of seed potato sold by DSC for the period 1999-2003 was 389 mt. The average price received by the contract seed growers over the period was 5.43/kg for red and 4.75/kg for white variety respectively. The average selling price for last five years was 8.26/kg for red and 7.43/kg for white variety.

Table 5.3: DSC seed potato statement, 1999 – 2003.

Year	CSGs	Qty. Produced Red	Qty. Produced White	Total Qty	Buying (Red)	Selling (Red)	Buying (White)	Selling (White)
	Nos.	-----mt-----			-----Nu./kg-----			
1999	378	203	212	415	4.47	7.44	4.00	6.86
2000	360	211	291	502	5.04	8.04	4.53	7.41
2001	139	109	177	286	5.73	8.59	5.16	7.91
2002	353	181	158	340	7.77	10.51	6.99	9.61
2003	359	160	241	401	4.12	6.70	3.08	5.38
Average	318	173	216	389	5.43	8.26	4.75	7.43

Source: DSC, 2004.

There are general farmers (ex-contract, non-contract farmer (individual and group)) who plant their own seed or exchange the seed among neighbour. They are not responsible for the maintenance of quality produce, so they seldom do crop rotation. These farmers change their seed when they see lots of deformed tubers and low yield. As the certified seed are expensive, the farmers usually will buy small



quantity around 100-200 kgs and multiply for subsequent generation for his/her own requirement. The Extension Agents provide necessary technical advice on the production technology. As their produce is not sold as seed the Quality Control measures are not applied to them but their produce are again planted as seed by the growers in next generation. However, there are times when DSC purchases seeds from individual and/or group of farmers depending on the demand and quality. Consumption potato is marketed through Food Corporation of Bhutan (Auction Yard) at Phuntsholing as ware potato.

Seed Potato Grower Groups, which was initiated by BNPP in the year 1994, are located in Kanglung and Yangneer geogs of Trashigang Dzongkhag. These groups were initiated to address the problem of individual seed growers, mainly to address the problem of not being able to effectively produce and market seed potatoes. The members of the SPGGs have on an average 0.8-1.2 ha of land of which 0.4- 0.8 ha were used for growing seed potatoes (Wal Van der *et al.*, 2002).

Table 5.4: SPGGs and numbers of group member for the year 1994, 1997 & 2004.

Sl. No.	Group	Number of Group Members		
		1994	1997	2003
1.	Mertsam	21	15	16
2.	Dopong	7	4	-
3.	Upper Pam	14	13	13
4.	Lower Pam	14	12	12
5.	Ashamdela	12	12	10
6.	Thragom	15	14	12
7.	Changzey	12	8	-
8.	Darjeeling	11	5	-
9.	Gonpa Singma	20	18	-
Total		126	101	63

Source: Farmers Association Support Unit (FASU), 2004.

Under the SPGG scheme, the groups had to buy foundation seeds from DSC for further multiplication, store and market subsequent generations (maximum of 3 years) of seed through Commission Agents (CAs) and in some cases on their own. SPGGs have the mandate to supply certified seed potato to the six eastern Dzongkhags<sup>3</sup>. While the seed potato demand for other Dzongkhags were met through DSC. Since the group formation in 1994, considerable numbers of groups were dissolved and in many cases the number of group members had decreased over the years (Table 5.4). It was apparent that the growth of the seed growers group was acutely impeded by the lack of group vision, systematic record keeping, poor communication among members, and frequent breach of group by-laws and poor enforcement.

The volume of demand from the Dzongkhags (eastern region) and available volume of seed potato with the SPGGs (Table 5.5) over the years suggest that there is poor coordination among the key players (DAO<sup>4</sup>, CAs and the SPGGs). As there is no demand forecasting mechanism or production planning methods, seed growers tend to mis-match the demand, often creating the gap. The distribution mechanism is poorly structured in anticipating demand and satisfying the seed potato demand. There seems to exist general trend of high and low volume of seed production. Peculiarly, there is dramatic decrease in the availability of seed, which was reported to have been due to export of seed as consumption potato.

Table 5.5: Seed potato demand and supply for six eastern Dzongkhags, 1995-1999.

Year	Total Demand	Qty. Available
	-----mt-----	
1995-96	119.90	141.15
1996-97	79.55	99.45
1997-98	55.05	166.90
1998-99	105.00	3.00

Source: FASU, 2004.

<sup>3</sup> Trashigang, Mongar, Lhuntse, Trashy Yangtse, Lhuntse, Pemagatsel and Samdrupjongkhar.

<sup>4</sup> District Agriculture Officer

## 5.9 Pricing mechanism

The pricing policies of agricultural products to a great extent are determined by factors such as difficulty in accessibility and poor transportation system, small size of population and the prevalent Indian market conditions. Further, lack of budgetary resources has made it impossible for the government to implement pricing policies, which require substantial subsidies.

In the past the FCB set floor prices for agricultural produce. However, with heavy losses incurred in the 1980s the government discontinued the practice. Presently, the FCB only purchases small quantities of surplus produce and sells through its different outlets.

### a) Seed potato price fixation by DSC

Based on the Price Fixation System used by the then BNPP the purchase price of seed potato are fixed. The 3 month highest average price (July, August and September) of auction yard is taken and the transport cost is subtracted (Phuntsholing Auction Yard) and a seed premium of 20% is added on to it. The average auction yard price, average buying and the selling price of seed potato for last five year (1999-2003) is presented in (Table 5.6).

Table 5.6: Price of seed potato during 1999-2003.

Red	1999	2000	2001	2002	2003
	-----Nu./kg-----				
Average Auction Yard Price	5.99	4.76	6.50	6.36	4.57
Average DSC Buying Price from Growers	4.47	5.04	5.73	7.77	4.12
Selling Price of DSC	7.44	8.04	8.59	10.51	6.70

Source: DSC, 2004.

When the growers were asked about the price variations they reported that when there will be good harvest of potato in India, the Bhutanese potato price will be very low. In the year 2002 the price of potato was fairly good as reported by the farmer that during that particular year the potato crops in India was damaged by the early monsoon.

The buying price is calculated by taking the highest average for three months (July, August and September) by DSC and the price will be fixed by MoA. The auction price taken is the average of six months (June to November). So, average auction price is more than the buying price of seed potato from the seed growers although 20% seed premium is added to it.. This is because the price tends to rise during the months of September and October as it is potato-planting season in India so, the demand for seed will be quite substantial. The average auction yard price for ware potato is 3.86% more than the average farm-gate seed potato price for the last five year (1999-2003).

It will be appropriate if DSC takes the highest average price of August to October so that growers get better price for their quality produce. It is clearly seen that when the auction price increase the buying price too increase and subsequently the selling price too. If the selling price is high the Bhutanese farmers cannot afford to purchase the certified seed, which will hamper the production of quality potato as well as the financial situation of DSC. The average selling price is 65.82% higher than the buying price of seed potato. It is mainly due to higher overhead and handling cost incurred in seed potato business. More over, the seed potato has to be stored for 3 months before it can be marketed.

### Seed potato price calculation – 2002

The average highest price of variety Desiree (ware potato) is taken for calculating the buying price of seed potato from the contract growers. (July, August and September). The price difference is mainly due to transport cost, which is deducted from the price (Table 5.7). In actual, farmers do not lose so much to what they would get if were to sell privately. They are further compensated by the 20% seed premium paid by DSC. Between Desiree and Kufri Jyoti, the former is a red variety, preferred more by the consumers, and fetches higher price.

Table 5.7: Seed price for Desiree (Red variety).

Particular	West Central	East Central
	Region	Region
	-----Nu/100kg-----	
Auction price	749.93	749.93
Transportation cost (311 km x 0.330/Qtl/km)	(-)102.63	(-)140.25
Price after deducting transportation cost	647.30	609.68
Seed Premium 20%	(+) 129.46	(+) 121.94
Buying price of Desiree from growers	776.76	732.00

Source: DSC, 2003.

#### b) SPGG Seed potato price fixation

The selling price for the seed potato produced by the SPGGs is worked out based on the average of the three months' (June–August) auction prices in (Samdrupjongkhar Auction Yard) every year. The maximum and minimum price received for red and white potatoes is taken into consideration to obtain the floor price for seed potatoes. On the computed floor price the following provisions are added;

- Seed premium 12% of the floor price
- Association profit 8% of the floor price
- Store Maintenance 5% of the floor price
- Contingency for possible future price increase 10% of the floor price
- Cost of gunny bags Nu. 30 per quintal
- Loading Nu. 5 per quintal

For the year 1996–2001, the average price received by the SPGGs for the seed potato was Nu. 6.71/kg (FASU).

### 5.10 Quality control

Quality control is essential when seed of improved varieties is to be produced. The use of a quality control system during all stages of a multiplication program and a seed certification system must be properly planned and effectively executed. The generation system (pre-basic, basis, certified seed classes) and prescribed isolation distances are used to safeguard the genetic seed quality; the varietal identity and uniformity have to conform to the varietal description. Procedures for seed production agronomy and conditioning are needed to optimize physiological (germination, vigor) sanitary (seed transmitted diseases) and analytical (purity) seed quality.

Quality Control and Regulatory Service was established in 1994 within the Ministry of Agriculture. They were responsible for Quality Control and Regulatory Service in Bhutan for agricultural and livestock products. QCRS have their staffs in the regional centers to carry out inspection and certification process. In August 2000 QCRS is renamed as Bhutan Food and Agriculture Regulatory Authority (BAFRA). It was established as a non-departmental organization under the Ministry of Agriculture, Bhutan. Its main function is to inspect the quality aspects and certify the food and agricultural products produced in Bhutan as well as the products exported and imported in Bhutan. BAFRA is responsible for implementing the Seed Act of

Bhutan – 2000 and thus have the mandate to certify seed potatoes supplied in the market.

The Seed Act of Bhutan – 2000 requires compulsory certification of seeds and plants placed in the market. The scope of the Seed Act – 2000 is limited to assuring quality standards of seeds that is traded. While the DSC and the SPGG delivers the seed potato to the consumers (farmers), it is the responsibility of BAFRA to protect the interest of the buyers/farmers' through regulation and certification. However, formal seed potato certification has not started as yet since the formal guidelines for field practices in seed potato production is yet to approved by National Seed Board, which is essential for quality control and certification.

### **5.11 Marketing**

More than 90% of the farmers in Bhutan are either small-scale commercial farmers who have to sell their surplus production to the market, or subsistence farmers who grow crops for their own needs. Large commercial farms are few and dispersed within countries. This situation complicates the distribution and marketing of seeds and planting material.

One of the major reasons why improved seed fails to reach farmers on time is the difficulty of distribution to remote areas. Seed marketing infrastructure is not developed to a sufficient level. In others, attempts have been made to establish peripheral distribution and marketing outlets at regional, district and town level and in cases where the communication network is satisfactory, seed is even distributed at village level. This has reduced the heavy burden of movement of large seed stocks to distant markets.

Marketing of seed potato follows three channels, namely private, FCB auction and Agricultural Commission Agents as shown in Figure 5.2. While individual farmers (or in groups) have freedom to operate seed potato trading, there are very few actually doing any significant business. The Figure 5.2 also presents how the demands

for seeds are collected, how the production planning is carried out and the marketing of seeds through various channels.

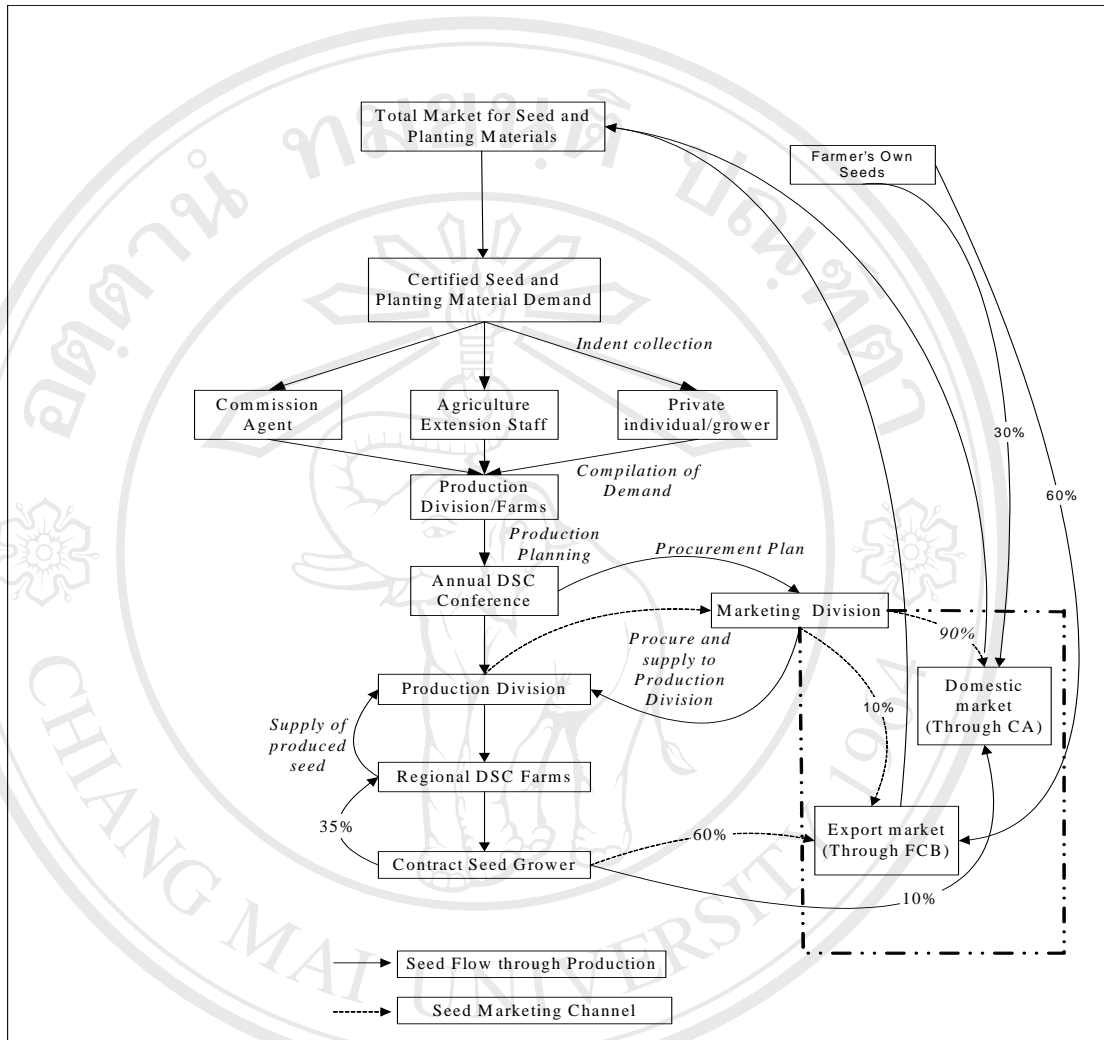


Figure 5.2: Marketing channel of seed potato.

Marketing of seed potato in the domestic market are done through commission agents. The commission agents place the demand for seed potato to DSC every year (December and January) with 50% of advance payment. DSC will deliver the seed potato to commission agents or to the distribution point as per the request. The transportation costs of seed potato to various Dzongkhags are borne by DSC. In case of export, after receiving the full payment from the parties the seed potato is transported to Phuntsholing where the Indian buyers will collect their goods. The export of seed potato is not consistence over the years. It ranges from 100 mt to 350 mt.



### 5.11.1 Commission agents (CA)

The system of Commission Agent (CA) was introduced in 1989. Commission Agents are identified and appointed by the Dzongkhags and are responsible for distribution of seeds, plants, fertilizers and agricultural tools, implements and machineries. The transportation costs of the input supply to the farmers are subsidized by the government and the CAs receives 10% of the value of input distributed to the farmers as commission from the Government.

CAs collect demand from the farmers and/or an order is placed when inputs are needed and then distribute it to the farmers in their locality. The performances of the CAs are far from what they are expected to do. Majority of CAs do not have the knowledge about farming, so they cannot deliver the information to the farmer with the seed. More often the demand collected from the farmers does not pay off the trouble and the time taken to source the inputs, which greatly discourages the CAs to concentrate on inputs supply. The system operated as such is not lucrative when there is very less farmer to use the certified seed. Thus, there is a need to assess and review the input supply mechanism in place.

Considering that the commission agents are the main channels for sale of agricultural inputs, they too have a critical role in distribution of seed potato to different parts. However, as they deal with a variety of inputs ranging from agro-chemicals, seed to agricultural tools, their coverage in terms of CA to farmer ratio may not be uniform in different districts. The ratio is dependent on population and also the demand for improved technologies. Table 5.8 clearly shows the variation in CA-potato grower ratio in different districts. While there is only one CA in some districts, there are 13 in one of them. This difference is mainly related to the dispersed nature of settlement, and presence of development projects, which provide support and promote modern technologies.

Table 5.8: Ratio of growers and commission Agents.

Dzongkhag	Total households*	Households growing potato**	Total households growing potato	No. of CAs***	Growers/CA ratio
	-Household-	----%----	-Household-		
Thimphu	2180	26.7	582	3	1:194
Paro	2847	31.9	908	3	1:303
Ha	1137	43.4	493	1	1:493
Chhukha	3291	16.2	533	6	1:890
Samtse	6128	2.1	129	1	1:129
Punakha	2001	5.5	110	1	1:110
Wangdue	3264	31.3	1022	2	1:511
Gasa	440	21.2	93	1	1:930
Tsirang	2844	21.7	617	1	1:617
Dagana	2448	8.1	198	2	1:990
Bumthang	1929	66.6	1285	2	1:642
Trongsa	1703	20.4	347	1	1:347
Zhemgang	2145	9.7	208	2	1:104
Sarpang	1582	9.6	152	1	1:152
Mongar	4490	25.1	1127	4	1:282
Lhuentse	2506	20.4	511	3	1:170
Yangtse	3294	18.6	613	4	1:153
Trashigang	8464	33.5	2835	13	1:218
Pemagatshel	2547	23.8	606	3	1:202
S/Jongkhar	5016	7.6	381	1	1:381

Source: \* DOP, Ninth Five Year Plan 2002-2007.

\*\* MoA, RNR Census 2000.

\*\*\* DSC 2004.

At present there are only 55 CAs in the country that too only few are actively involved in the marketing of agricultural inputs (Table 5.8). As Tashigang being the largest Dzongkhag and has the highest number of households, accordingly the CAs

were appointed by the Dzongkhag (Dzongkhag authority) to cater the needs of the public. There is a need to rationalize the number of CAs in every Dzongkhag for the better coverage and supply of inputs to the farmers. To improve the situation the seed marketing infrastructure in term of seed stores and sale counters needs to be developed at regional, Dzongkhag and geog level, which may greatly facilitate the marketing network for DSC.

### **5.11.2 Food corporation of Bhutan (FCB)**

The government with a view to promote the agricultural marketing system established the Food Corporation of Bhutan (FCB) in 1974. The FCB was given the responsibility of ensuring a fair price for both the producers and consumers and the distribution of food and essential agricultural produce. The FCB is still the main public sector concerned with agricultural marketing. Its responsibility ranges from procuring quota-food stuffs from India to the storage and distribution and the maintenance of a small buffer stock of food grains. The FCB operates three permanent auction yards (Phuntsholing, Gelephug and Samdrupjonkar) It provided a common trading place and ensures fair prices to framers. However, the credit system is poor for both the buyer and seller due to the difficulties in collecting payment. The FCB takes 3% commission for assisting to market the produce from the farmers.

### **5.11.3 Local traders**

The local traders play important role in the marketing of the potato. Since the majority of the farmers are poor and they lend money from the local trader to buy food stuffs for their family. The farmers are given money either in cash or in kind (rice) during the potato growing period in condition that the farmers have to give their potato to the trader. The traders collect the potatoes and transport it down to Phuntsholing and sell through auction yard (FCB).

## 5.12 Farmers' perception on existing operating mechanism

As reported by Wiboonpoongse *et al.*, (1998) the viability of contract farming depends on the satisfaction of both the farmers and firms where the profitability is certainly the key component. At the initial stage of contract the farmers' perceptions and their attitudes towards contract farming are important.

The viability of contract farming also relies on the capability of both growers and company to solve production problem. The reduced confidence in company's competence and expertise affects grower's attitude to the probability of risk and uncertainty. The company's operations mainly depend on the performance in the grower's fields and therefore, there is common ground for improving farming practices to make the contract farming viable option to derive the benefit for both the parties.

### 5.12.1 Motivation to participate in contract seed potato production

It is important to enhance the awareness on seed production program among farmer and motivate them to participate in the program. In the two study sites, with regards to popularity of contract seed production program and institutions involved in motivating the farmers to participate in the program, farmers considered six agencies through which they have been informed or motivated to participate in the program. While more than 95% of the respondents across all three categories considered Ministry of Agriculture as a source of motivation, Rural Development Project, BNPP and DSC have played a crucial role in influencing contract and ex-contract farmers. It is also evident that Agricultural Extension network of the Department of Agriculture mostly focuses on informing about seed production program to non-contract farmers. It is also interesting to find that only 2% of respondents representing ex-contract have been motivated by the coverage on seed production program in the national mass media (Figure 5.3).

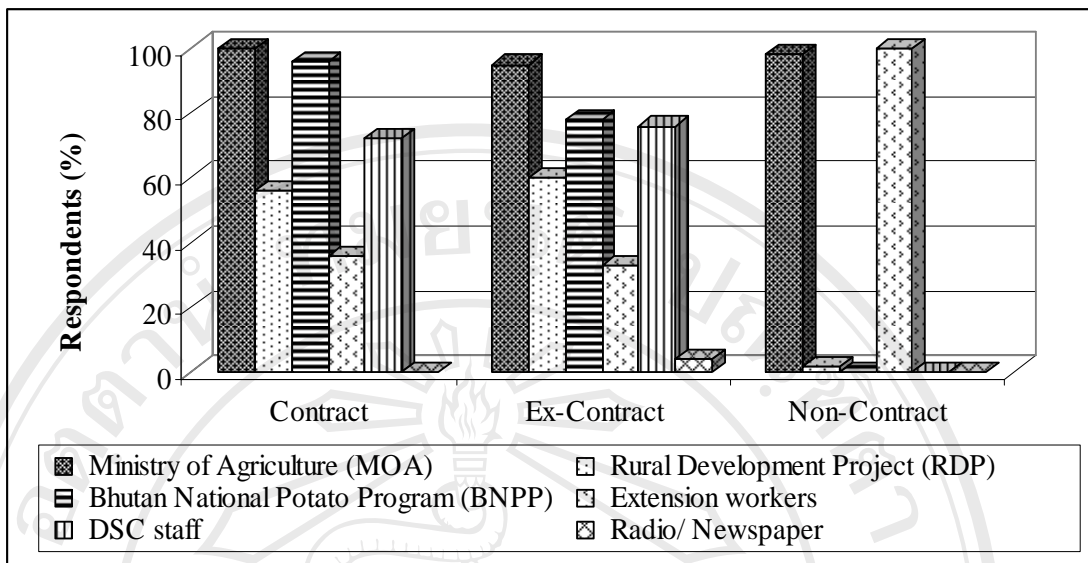


Figure 5.3: Sources of motivation to produce seed potato.  
 Source: Survey, 2004.

### 5.12.2 De-motivating factors for contract growers

It is revealed from the study that most important reason stated by the growers for leaving the contract seed production is non-availability of credit for inputs. Because of the new procedures where DSC delays in payment and non-profitability of seed potato production also influence farmers to withdraw from the contracts. In contrast stringent seed potato production procedures did not influence the farmers' decision (Table 5.9).

5.9: Reasons for leaving CSG Program.

Reasons	Respondents (%)
Inputs are not given in credit	29
Not profitable	23
Late payment for seed	17
Seed price fluctuate every year	16
Labour requirement is high	10
Strict rules for seed production(Roughing/Rotation)	5

Source: Survey, 2004.

When the respondents were asked whether they would like to join the program again and would like to lead the group or be a member of the group, 85% of the respondent would like to re-join the program if the weaknesses of the current program are improved. However, none of them would volunteer to become the group leader of such group. While 15% of them would not even like to join the group, 85% would prefer to be a member of such group mainly for increased income, assured market, and stable price. The main reasons for not joining the group are lack of trust amongst members, lack of experiences, and lack of ability to decide independently. All desiring to join the group prefers to work as contract seed grower for DSC.

### 5.12.3 Reason for non-contract farmer not joining contract seed program

The non-contract farmers reported that contract seed production is not profitable. Unlike other seed crops the price for seed potato is not fixed. The price of potato is fixed as per the auction yard price at Phuntsholing, so the farmers will not know how much his produce will earn in advance. When there is bumper harvest of potato in India the price for Bhutanese potato in the auction yard will be very low and the seed price of potato also will be low (Table 5.10). This is clearly shown by the restriction of farmers to plan and market. The 93% of non-contract farmers would not like to join contract seed growing program. The remaining 7% prefers joining the program for higher income, assured market and stable price for their produce.

Table 5.10: Reasons for non-contract farmer not joining CSG program.

Reasons	Respondents (%)
Not profitable	31
Price not fixed earlier	24
Required more labours	22
Less freedom to sale	15
Land not suitable for seed potato	8

Source: Survey, 2004.

#### 5.12.4 Suggested change in DSC program

Respondents have suggested 7 changes for the seed grower program as given in the graph below (Figure 5.4). Inputs should be in credit for the growers group, better price for the produce, seed source for growers should be provided from Phobjikha. There should be increase intensity of field monitoring by DSC staff and training on production on regular basis are important changes suggested by the growers.

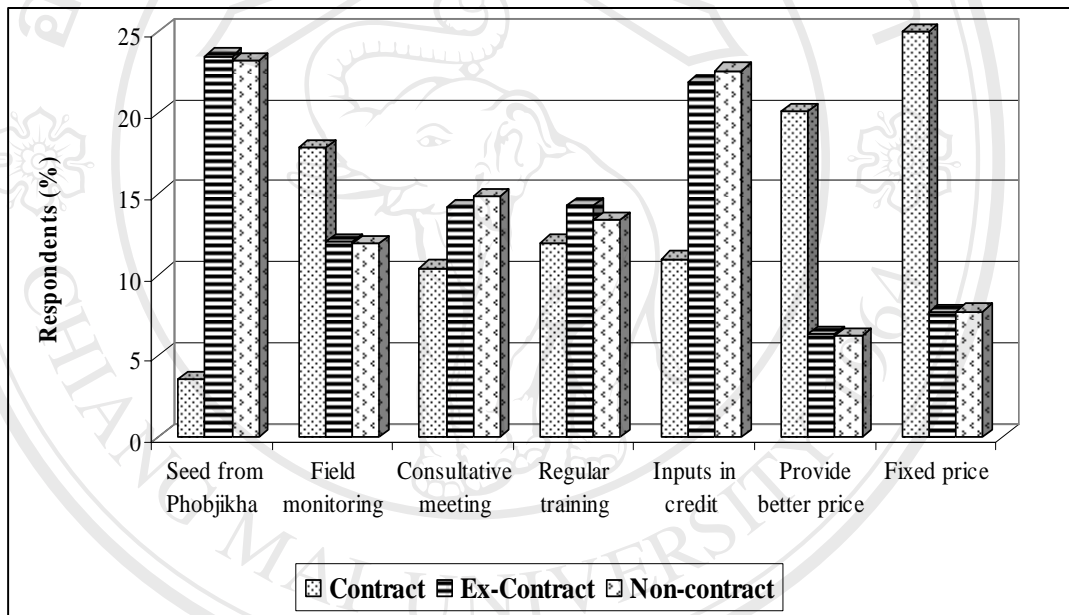


Figure 5.4: Suggested change in DSC program.

Source: Survey, 2004.

All the respondents considered cash payment on delivery to their produce. Seed should be supplied by DSC from Phobjikha farm. There should be constant inspection of field by DSC staff to maintain the quality aspects of seed as it is for the success of the program. Contract farmers also considered the provision of packing material to be maintained as given currently. (Figure 5.5)

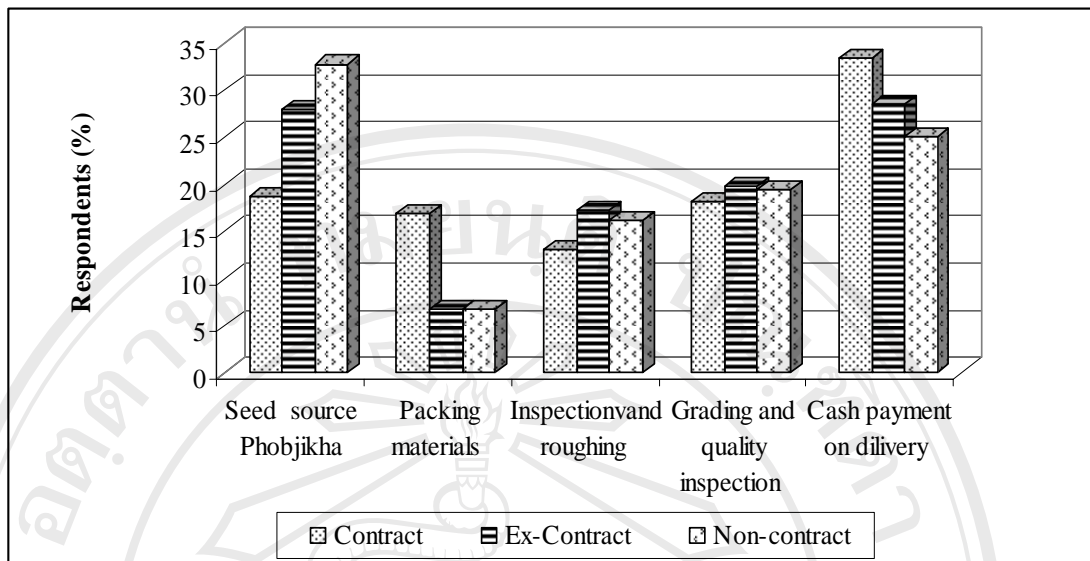


Figure 5.5: Respondents' suggestions for a seed grower program.  
Source: Survey, 2004.

Often farmers express strict roughing and crop rotation rules being very stringent. However, in the survey all farmers aspiring to join contract seed grower supported the rules of roughing potato field and crop rotation (potato only once in 4 years). Respondents suggested that for improving the seed quality the important cultural practices are roughing and crop rotation, which need to be followed by every seed growers. The approaches to ensure adoption of roughing are given in Table 5.11 and the approaches to ensure the adoption of crop rotation are shown in Table 5.12.

Table 5.11: Strategies to control and enforce rules relating to roughing.

Strategies	Rank
Regular field visit by DSC staff	1
Training in seed production by DSC	2
Extension staff should also be trained	3
Rejecting the field with off-type	4

Source: Survey, 2004.



Table 5.12: Strategies to control and enforce rules relating to crop rotation.

Strategies	Rank
Growers should have enough land for crop rotation	1
Field selection by DSC before planting	2
Growers should be made aware about mixture	3
DSC should have seed production guidelines	4

Source: Survey, 2004.

#### 5.12.5 Farmer satisfaction with contract seed grower program.

The farmers were not satisfied with the price they receive for the seed. It is known to them that 20% seed premium is added on the highest average price of three months of the auction yard. Farmers argue that the 20% seed premium is for the 30% of their total produce that will not cover their cost of seed production. The 20% premium over the ware potato does not meet the cost for grading, sorting and packaging of seed potato. The farmers reported that it is very labourious and time consuming. Farmer suggested that the seed price should be fixed as per the cost of seed potato production. Since the introduction of cash and carry system the inputs are not provided in credit, so many farmers left the contract. Farmers reported that there is no incentive to be DSC's seed growers. Unlike in the past the technical backstopping to the growers is also lacking which leads to the poor quality seed potato production by the growers.

#### 5.13 Aspects of contract farming

Experiences from the other countries and literature reviews shows that contract farming has significant positive impact on rural incomes, so it has become highly attractive to some LDC governments and many donor agencies. There is now a proliferation of contact farming schemes throughout the world. Wiboonpongse and Sriboonchitta (2005) reported in *Contract Farming in Thailand: Net Results in the Three Decades*; explicitly reported that contract farming in Thailand has expanded rapidly.

Well-managed contract farming is an effective way to coordinate and promote production and marketing in agriculture. The prime advantage of a contractual agreement for farmers is that the company will normally undertake to purchase all produce grown, within specified quality and quantity parameters. Contracts can also provide farmers with access to a wide range of production and technical services that otherwise may be unobtainable. Farmers can use the contract agreement as collateral to arrange credit with a commercial bank in order to fund inputs (Eaton and Shepherd 2001). Thus, the main aspects of contract farming for farmers are:

- provision of inputs and production services;
- access to credit;
- introduction of appropriate technology;
- skill transfer;
- guaranteed and fixed pricing structures; and
- access to reliable markets.
- risk reduction

**Provision of inputs and production services:** Many contractual arrangements involve considerable production support in addition to the supply of basic inputs such as seed and fertilizer. A company may also provide free training and extension services. This is primarily to ensure that proper crop husbandry practices are followed in order to achieve projected yields and required quality

**Access to credit:** The majority of smallholder producers experience difficulties in obtaining credit for production inputs. Contract farming usually allows farmers access to some form of credit to finance production inputs. The existence of collateral in the form of a crop contract can also make it easier for a grower to get loans from a private or public bank.

**Introduction of appropriate technology:** New techniques are often required to upgrade agricultural commodities for markets that demand high quality standards. New production techniques are often necessary to increase productivity as well as to

ensure that the commodity meets market demands. Nevertheless, the introduction of new technology will not be successful unless it is initiated within a well managed and structured farming operation.

**Skill transfer:** The skills the farmer learns through contract farming may include record keeping, the efficient use of farm resources, improved methods of applying chemicals and fertilizers, knowledge of the importance of quality and the characteristics and demands of export markets. Farmers can gain experience in carrying out field activities following a strict timetable imposed by the extension service.

**Guaranteed and fixed pricing structures:** Company indicates in advance the price(s) to be paid and these are specified in the agreement.

**Access to reliable markets:** Contract farming offers guarantee market to the growers as they do not have to search for and negotiate with local and international buyers.

**Risk reduction:** Due to access to these services, in Thailand, after FTA between Thailand and China, government compensates garlic growers 1,000 baht/ rai for replacing garlic by annual crop under contract system.

#### 5.14 Performance of contract farming

Conceptually, contract farming is expected to provide several advantages for the growers and the company. The contract can be very useful to the company as it receive specified quality produce from the growers. The company does not have to invest in land, hire labour or manage large-scale farming operation, which other wise would cost a lot to the company. In turn the contract growers will also benefit from the contracts. Some of the critical advantages of participation in contract farming are:

- Access to new varieties
- Assured market and better price for the produce
- Subsidized transportation

- Access to regular technical advices
- Well labeled packing material
- Access to timely inputs
- Training

With regard to the comparative importance to the above advantages, all the contract and ex-contract farmers reported assured market as the most important advantage. The ex-contract farmers thought training provided by DSC on seed production and crop management; subsidized transportation, and good price offered by DSC. In case of contract farmers access to new varieties, training and timely input availability as the fundamental advantages of the program (Figure 5.6).

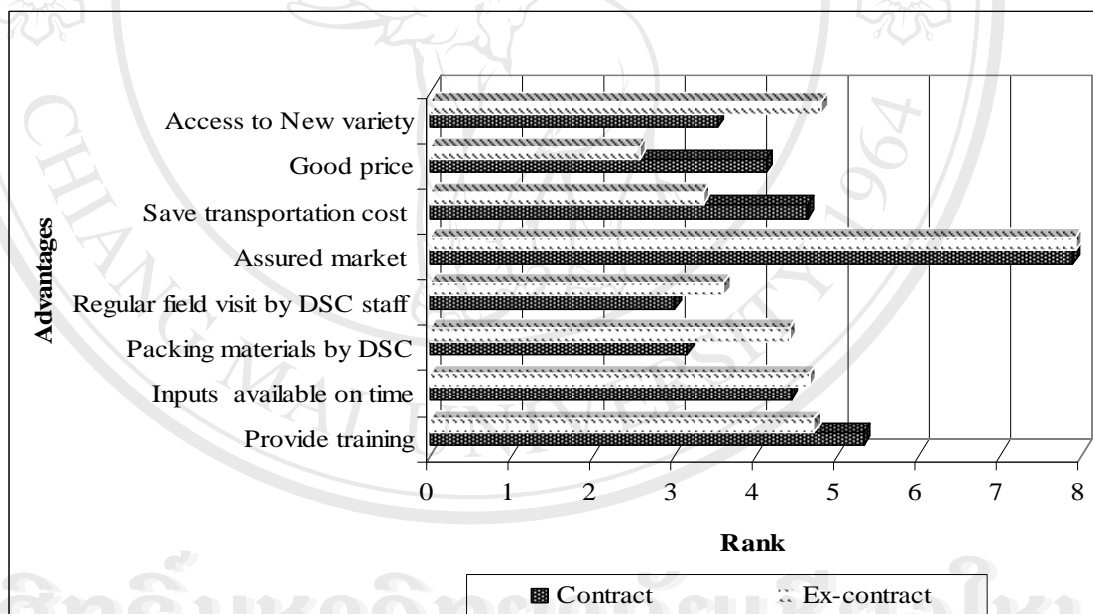


Figure 5.6: Advantage of participation in contract seed production.

Source: Survey, 2004.

### Disadvantages

Despite many advantages, farmer respondents also pointed 7 disadvantages of the contract seed production program. Some of the disadvantages are:

- Stringent crop rotation rules
- Strict crop roughing schedules

- Risk of crop rejection due to strict crop standards
- Lengthy crop production guidelines
- No existence of pre fixed price
- Low price

Farmers of contract and ex-contract categories stated that price offered by the DSC based on the FCB auction is generally low. Farmers remarked that over the years they have always received prices lower than the price of consumption potato. Both groups of farmers ranked price, prefixed price and risk of crop rejection as the most critical disadvantages (Figure 5.7). Seed potato production is also labour intensive, which added onto cost of production. Farmers also consider the problem of marketing in terms of control by DSC as major disadvantage.

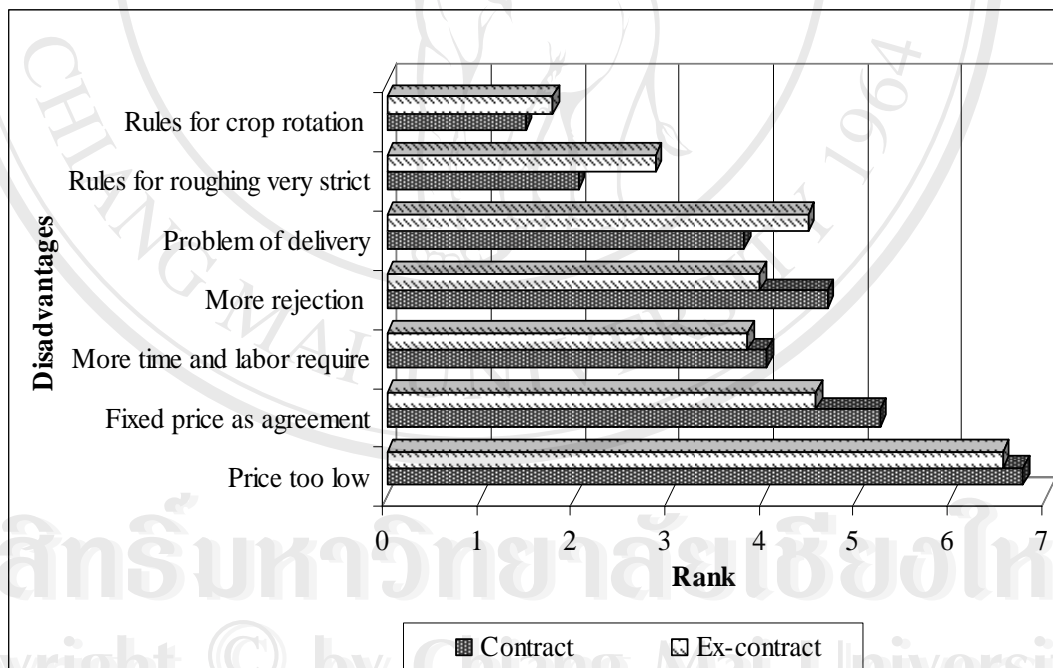


Figure 5.7: Disadvantage of participation in contract seed production.  
 Source: Survey, 2004.

### 5.15 Breakdown of seed system

A national seed production program established with strong donor support and heavy subsidies could not be sustained by the Government and broke down almost completely by 2004, as indicated by the quantity of seed sold in the country and the number of contract seed growers. There is no quantitative data documenting the decline in seed quality, but the problem is acknowledged by the Government and by potato specialists. Dr. Hidalgo (2002) for example said diplomatically: The “modern” seed scheme is utilized, but requires significant technological improvements. Factors that contributed to the decline of the seed multiplication system include:

- Introducing of an expensive, donor driven system in the eighties
- Heavy reliance on laboratory and screen house production
- Insufficient attention given to the traditional seed producing systems
- Problems associated with volunteer potato plants in seed producing fields
- Administrative problems associated with changes in the Ministry of Agriculture

While the absence of a functional seed multiplication program may not be very serious for ware potato production, it strongly affects the opportunities for exporting seed potato as well as the seed industry.

### 5.16 Summary

The review of operating mechanism of seed potato production system in Bhutan was useful for understanding the present status of seed potato production system in Bhutan. The various stakeholders in the system have its own responsibilities for the improvement of the seed sector. It is revealed from the study that the Seed Potato Growers Group initiated to cater the seed demand of the eastern Bhutan was not successful as it was expected. Likewise the system of contract growers initiated earlier in DSC was not growing well due to many defaulters in repayment of inputs, thus DSC had to change the policy of providing credit in to cash and carry system in the contract program in 2003. With the introduction of cash and carry system the

numbers of growers have left the system, which has greatly affected the availability of quality certified seed potato to the general growers.

It is also evident that in contract farming system both the company as well as the growers should have mutual benefit and they need to understand each others obligations. One of the prerequisite in contract farming is to support the smallholders with required inputs on credit basis as the farmers are poor and cannot afford to purchase the inputs. These are not happening in the Bhutan, which is very much crucial for the success of the seed business. DSC is only the seed company in Bhutan and is responsible for production and distribution of seeds required by the Bhutanese farmers; due to the limited resources and capacity of DSC it has to depend upon the CSGs for seed production. Therefore CSGs play vital role in the DSC's seed business. In order to strengthen and prosper in the business the contract system needs to be reviewed by the management and lesson learned from other successful country like Thailand. Although, market plays important role in the business, looking at the quality aspects as well as the globalization in the recent year the system of contract farming will have very important role to play. It is difficult to assure the quality produced by the general farmers as the source of seed and number of generation will be difficult to ascertain. In this context the contract seed growers can greatly support the company as well as will have potentials benefits for rural development.