ACRONYMS

AEC	Agro Enterprise Center
AFU	Agriculture and Forestry University
BS	Breeder Seed
CBO	Community Based Organizations
CBSP	Community Based Seed Production
CEAPRED	Center for Environment and Agricultural Policy Research, Extension & Development
CS	Certified Seed
CSB	Community Seed Bank
CSPSP	Commercial Seed Production Support Program
DADO	District Agriculture Development Office
DISSPRO	District Seed Sufficiency Programme
DoA	Department of Agriculture
FNCCI	Federation of Nepalese Chambers of Commerce and Industry
FORWARD	Forum for Rural Welfare and Agricultural Reform for Development
FS	Foundation Seed
GDP	Gross Domestic Product
GMO	Genetically Modified Organisms
IAAS	Institute of Agriculture and Animal Science
IS	Improved Seed
LIBIRD	Local Initiatives for Biodiversity, Research and Development
MoAD	Ministry of Agricultural Development
NARC	Nepal Agricultural Research Council
NSB	National Seed Board
NSCL	National Seed Company Limited

PACT	Project for Agriculture Commercialization and Trade
SEAN	Seed Entrepreneurs Association of Nepal
SQCC	Seed Quality and Control Center
SRR	Seed Replacement Ratio
STCL	Salt Trading Company Limited
TSR	Total Seed Requirement
TSS	Total Seed Supply
VDC	Village Development Committee

DESIGNING INTERVENTIONS TO STRENGTHEN SEEDS VALUE CHAINS FOR INCREASING PRODUCTIVITY AND GENERATING EMPLOYMENT OPPORTUNITIES THROUGH SELF SUFFICIENCY

OVERVIEW

Agriculture employs around two-third of the Nepalese population and contributes around one-third in the national Gross Domestic Product (GDP). Poverty is rampant and nearly one-fourth of the total population of Nepal live below the poverty line. Majority of this group of people are smallholder farmers. Therefore, the role of the agriculture sector is crucial in national economic development and poverty reduction. However, subsistence farming predominates in production operations, often with traditional methods, and limited use of external inputs, especially improved seeds and mineral fertilizers, resulting low agricultural productivity and untapped market potential of Nepalese agricultural products. Slow growth of the agriculture sector increases food insecurity, mainly among smallholder farmers and landless labors. To address the food security situation and livelihoods concerns of poor and smallholder farmers, increasing crop productivity, commercializing farm businesses and making agricultural products competitive in the domestic as well as international markets are the immediate needs. The use of high quality seeds and that too produced in Nepal to replace the excessive imports plays important role to attain success in agriculture production. Specific interventions, such as the investment in varietal development and maintenance, seed infrastructure, seed production and processing facilities, marketing facilities, and in managing skilled human resources are required to improve crop productivity and facilitate the dissemination of crop varieties and technologies in a wider scale. Sustained increase in agricultural production and productivity is dependent, to a large extent, on development of new and improved varieties of crops and an efficient system for timely supply of quality seeds to farmers

The Ministry of Agricultural Development recognizes there are problems in three aspects: Policy, implementation and awareness. Nepal has seed policy, act, regulations and even recently published Seed Vision. Interestingly, the seed act was released before the seed Policy. Additionally, there is a lot of room for synchronizing all the policies and regulations. The Ministry wants to make record-keeping more scientific. The Ministry also wants to strengthen the value chain of seeds and encourage farmers and entrepreneurs into Commercial pursuit of seed business. Moreover, the Ministry wants to sensitize and make Farmers aware about the economic importance of seeds. As a Daayitwa Fellow I have worked closely With the Ministry on these issues. This report has briefly analyzed the present practices, policies and value chain in seed sector and have suggested necessary measures to improve present seed scenario in Nepal.

INTRODUCTION:

65.6% of active labor force in Nepal are dependent on agriculture and agriculture contributes to only 28.79% of GDP (MoAD 2013/14). Increased agricultural yield brings economic affluence and escalates income of farming community. Seed is the utmost determinant of agricultural production potential, on which the effectiveness of other agricultural inputs is dependent. Of all the inputs, quality seed plays the most important role. It is one of the least expensive but most important factors influencing yield. Seeds of suitable features are required to meet the demand of varied agro-climatic conditions and intensive cropping schemes. Seeds of improved varieties with specific traits also reduce the risks and uncertainty of climate change. Sustained increase in agricultural production and productivity is dependent, to a large extent, on development of new and improved varieties of crops and an efficient system for timely supply of quality seeds to farmers. Empirical evidences suggest that the use of high quality improved seeds increases the crop yield by 20 to 30 percent (Thompson, 1986). The planning of uninterrupted and sustainable supply of high quality seeds of improved varieties helps to assure seed security, that, in turn, addresses food security. The use of high quality seeds and that too produced in Nepal to replace the excessive imports plays important role to attain success in agriculture production. Various governmental and non-governmental institutions have conducted different programs with major focus on seed production and dissemination. There has been limited study undertaken in the area of identifying the policy gaps and suggesting interventions to upgrade the entire seed value chain to make Nepal self-sufficient on seeds with generating more employment opportunities.

PROJECT OBJECTIVES:

The objectives are as follows:

- To characterize seed system of Nepal
- To study existing seed value chain in Nepal
- To study of best practices in seed sector in Nepal
- To assess present market condition of seed sector, market size, key players, gaps, pricing and seed distribution networks.
- To identify constraints in policy and practice
- To suggest intervention activities for upgrading seed value chain.

METHODOLOGY

- Desk research
- Collection of secondary data from offices and websites.
- Consultation with governmental and non-governmental personnel
- Ground Level Survey
- Interaction with various stakeholders
- Consultation with Seed Entrepreneurs

PROBLEM STATEMENT

Nepal has not been self-sufficient on seed for many years despite the governmental efforts to substitute import. There has been very high levels of imports of seeds of cereals and vegetables each year from abroad mainly from India and China. The country has limited priorities on seed

research and extension. Focus on hybrid seed production based on farmers need is inadequate and hence most of the hybrid seeds are imported. Hence the available options for quality seeds of new competent farmer preferred varieties is limited. The source seeds produced by public research and stations are not amply linked to seed multiplication and marketing chains of private sectors to multiply and market subsequent cycle of improved and certified seeds. Similarly low seed replacement ratio in cereals, limited availability of quality and affordable seeds limit both the cereal and vegetable productivity improvement. Private seed companies are evolving but their participation in varietal research and development is quite minimal. There is lack of proper information on improved seed produced from different seed initiatives. There is not precise and updated information on demand and supply of seeds of cereals and vegetables. Unavailability of sufficient quality seeds at the right time and place stands as the main constraint in improving the economic status of Nepalese farmers. Unfortunately, the barrier persists despite seed development initiatives of the past 50 years. Nepalese agriculture is yet to witness modernization and competitive development in seed sector to march towards self-sufficiency.

SEED SYSTEM IN NEPAL

Broadly, two types of seed system are recognized in Nepal: informal and formal seed system.

Informal Seed System

The informal seed system is characterized by farmers producing and preserving their own seeds for successive planting. Often, they exchange this small amount of seeds with other farmers as gift, and for both monetary and non-monetary value. This system provides more than 90% of planting materials in the country (PACT 2012).

Formal seed system

The formal seed supply system generally consists of institutional and organizational arrangements comprising institutions, enterprises and different organizations involved in the supply of improved varieties from the research system to the farmers. This system uses seeds of high yielding varieties or hybrids which have been released or permitted by SQCC for multiplication and sale. It comprises different phases of seed cycle: Breeder, Foundation, certified and improved seeds. Agencies involved in formal seed production in Nepal, comprises seed production by farms and stations of NARC and DoA, contract seed production by NSCL, STCL, NGOs like CEAPRED, LIBIRD, FORWARD, and other seed companies, CBSP, DISSPRO and seed imports. In Nepal it provides less than 10% of planting material of nationally recommended varieties (PACT 2012).

Agencies in Nepal's seed System

Ministry of Agricultural Development (MoAD)

MoAD has a role in designing policy and planning, resource allocation for seed sector and human resource development to strengthen seed sector. It has role in creating enabling environment for public and private sector participation in seed industry.

National Seed Board (NSB)

It has a role in planning and coordination, policy formulation and support, monitoring of seed related provisions, preparation of balance sheet based on national seed demand and supply. Ensuring the supply of source seeds to all seed growers and release and register new varieties and discard obsolete varieties.

Nepal Agricultural Research Council (NARC)
It has a role on strengthening of varietal development, maintenance breeding, developing inbred lines, research on hybrid seed production technologies, production and supply of breeder and foundation seeds, identification of location specific crops or varieties, partnership in seed research with private sector, collection, characterization and utilization of indigenous cultivars in crop breeding.

Seed Quality Control Centre (SQCC)
It acts as NSB secretariat and provides seed quality control services. It works for laboratory accreditation with ISTA, APSA, and UPOV. It has a role in GMO testing, certification and varietal registration, support to private sector to follow seed quality and internal quality assurance system and monitor the activities of organizations in seed sector to ensure the supply of quality seeds in the market.

Department of Agriculture and its directorates
It has a role in planning and implementation of seed program, providing technical support, monitoring seed program, supporting seed growers and seed sector production and marketing, Develop human resources, market infrastructure development, seed price collection and dissemination, conduct seed marketing surveys, seed competitiveness studies and reviews, dissemination of seed technologies and support seed extension .

National Seed Company Limited
It has a role on production of foundation and improved seeds, seed multiplication, procurement, processing, storage and distribution through its dealer networks, distribute seeds to remote and rural areas where private sector is absent in seed business, find provision of seed storage facilities for buffer stock maintenance at different ecological regions.
Regional Level Agencies includes Regional Agriculture and Livestock Directorates, Regional Seed Testing Laboratories, Regional Soil and Plant Protection Laboratories and Regional Agriculture and Livestock Research Stations whereas District Level agencies includes Agriculture and Livestock development offices and service centers.
Non-government agencies like Seed Entrepreneurs Association of Nepal (SEAN), Federation of Nepalese Chambers of Commerce and Industry (FNCCI), Agro Enterprise Center (AEC) are functioning to strengthen seed sector. Similarly, Seed companies, seed retailers, Seed growers, Seed retailers (Agro vets), Seed growers (seed producers' groups, cooperatives, and Individual entrepreneurs), Community based organizations (CBO) and civil society organizations (CSO), Financial Institutions (Banks, cooperatives) , academics like IAAS and AFU and private academic institutions and seed laboratories are playing their roles to work coherently on seed sector in Nepal.

Limitations and Strategies for Intervention:

Majority of the farmers in Nepal are small scale farmers. They are mostly inclined in sustaining their livelihood from yield rather than the commercial production and marketing. Thus they have very less interest and knowledge on improved seed varieties and are mostly inclined towards informal seed system. Those farmers are therefore living under a very low economic status and are using low cost agricultural practices such as using local landraces that are giving lower yield. To attract such farmers towards formal seed system, emphasis must be primarily given to attract them towards commercial production within the set of land resources they have. Only then can they be attracted towards formal seed system.

Thus government must prioritize on awareness generating activities. Mass media such as local FM radios can be used to grab attention of farmers. Each VDCs need to establish Seed Support system within their Agriculture development entity. Farmers must be ensured that their products receive proper value in market. Once they are convinced and attracted to commercialization of their farms, they shall be definitely be inclined towards formal seeds system.

In addition, since 90% of seeds are supplied through informal system and it's very difficult to change the whole scenario at once, special attention needs to be given to the procedures and technology involved in ongoing seed saving tradition. This practice will improve the seed quality of seeds that are being used for cultivation which will be able to boost up their farm yield. This can be continued up to the stage when the country is able to assure the effectiveness of timely supply of improved seeds to all ground level farmers. Farmers need to be encouraged to perform under groups as various multipurpose cooperatives and financial institutions are directly involved in distribution of inputs and provision of credit to farmers groups than to single farmer. Beyond that sales assurance of seeds and grains produced by farmers whose quality is fulfilled is to be done by government to bring more farmers under formal system.

Furthermore access to seeds of new varieties is limited by many factors including capacity of plant breeders to produce breeder's seed, seed companies to produce quality seed and extension workers and retailers to promote new varieties. This should be improved by advancing capacity of plant breeders to advanced breeding technologies, designing tax break system for loan provided to seed companies, arranging special incentives for extension workers to travel remote areas and promote new varieties. Modern communication tools like mobile phone services, sms services,seed information call centers, television broadcasting about the improved seeds could be done. Government should assign special program to promote newly released varieties through national television and other local FM and television channels.

SEED VALUE CHAIN IN NEPAL

Seed value chain comprises of two major sectors. Seed input chain and output chain, the former is associated with supplying seeds to farmers and the latter is related with the obtaining of products from farmers and subsequent supply to consumers. Seed input chain comprises of seed development, release and registration, seed multiplication, seed processing and storage, seed marketing through dealers and other retail networks as appropriate to the farmers. The seed output chain relates to the output market in which farmers sell their production. It covers

production of grain or other kinds of products, relying on the crop, and all related trade activities.

The governing key stakeholders in seed value chains involved in the production and distribution of seeds of new varieties are public research and development agencies (NARC, DoA, NSCL), community sectors (CBSP groups, CSB, Cooperatives) , NGOs and private agencies signified by private seed companies, seed dealers and retailers. Variety development, maintenance and breeder seed production and supply are mainly carried out by public research institutions (NARC). Foundation seed is produced and multiplied by both public (NARC, DoA, NSCL) and private sector including the cooperatives and CBSP groups in close supervision of SQCC officials and some NGOs (CEAPRED, LI-BIRD, FORWARD). The commercial seeds (certified, truthful labeled and improved) are mainly multiplied and marketed by private seed companies, cooperatives and community based seed producers groups. The marketing functions are the main spheres of private seed dealers, retailers Agro vets and seed traders.

Participation and dominance of specific type of actors in seed value chains depends upon the production system and market accessibility of locations. In commercial market accessible favorable production regions of Terai as Chitwan, private sectors are active players in seed business due to their steadfast profit margins from economic volume of seed business. A fairly more number of functioning seed companies and seed dealers are concentrated in these commercial production locations. In semi-commercial production systems of majority part of Terai and market accessible Hills, a small number of private seed actors, cooperatives and CBSP groups are participating in seed business. Private sectors are mainly involved in marketing of seeds through contract seed production with farmers and purchase of community produced or publicly produced seeds. Public agencies such as District Agriculture Development office (DADO) through DISSPRO and I/NGOs through CBSP provide seed money and technical support in seed production, while local private seed companies support community and cooperatives by marketing community produced seeds. Risk prone and market inaccessible regions such as remote hills and mountains has very much limited participation of formal sector due to inefficient size of seed demand and remoteness to provide high yielding variety seeds and technical support services. Hence, informal farmer based seed system is dominant in these remote and subsistence production systems.

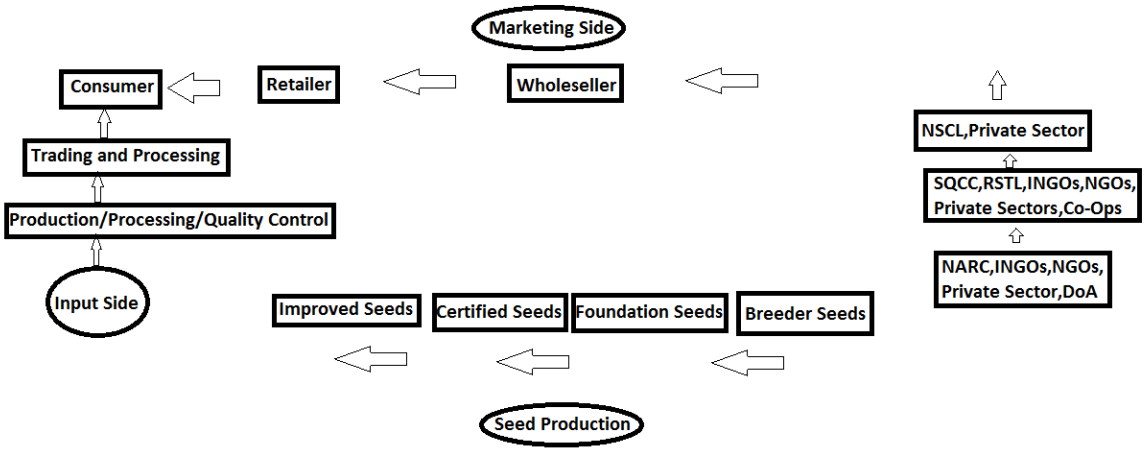

Fig: Seed Value Chain in Nepal

Limitations and Strategies for Intervention

In Nepal, there is dominance of public sector in seed research. Private sector are only confined to seed multiplication and distribution sides. There is a need to identify the potential of private sectors in seed research. Based on their potentials, they are to be encouraged on seed research by assisting them with resource and technology development. Strong participation of private sector is must to create a sustainable seed system. Public and private sectors should be encouraged to work in collaboration with national or international seed entrepreneurs for the development of seeds sector and thus increase production. Public private partnership is to be strengthened and this joint venture is to be established to create sustainable seed system. The price fixing needs to be scientific and should be based on demand and supply of seeds. Arranging financial systems for risk management by provisioning insurances against adverse climate conditions for both seed multipliers and growers is vital. It is important to focus on the innovative aspects to improve the value chain functioning like focusing on accessing market for products by providing farmers with infrastructures on transport and storage of farm products, processing technologies, training on market management to not only improve the quantity and quality of production but also relieve the farmers by making them independent from the fluctuating price of agricultural products. Promoting a participative research where producers, private sector, researchers and civil society work together to develop practices and technologies adequate to small producers' needs, expertise and possibilities, avoiding the adoption of high technologies which are not appropriate for the context could enhance the existing seed chain. The monitoring of the performance of the seed value chain needs to be focused on promoting good practices and changing less virtuous practices.

Furthermore, linkage between the seed input and output value chains is essential. Contract arrangements with farmers could be applicable in this case to lead an assured seed market. Any food and processing industry may contract with farmers to use high quality seed of specific varieties to ensure product evenness or other desired traits. This in turn will also benefit farmers in terms of credit supply for quality seeds and other inputs that they could pay back from their final harvests.

Before implementing a seed value chain program it is important to carry out a serious pragmatic study which should take into account the technical and productive, economic, social and cultural, organizational and institutional aspects. Thus, it will be possible to identify a program which is adequate to the context, which has realistic objectives taking into account the schedule of the program and which can be proven sustainable in time. Since a value chain intervention is planned, it is important to adopt a multi- stakeholder approach and make sure the planning takes into account not only all the phases of the value chain, but also the relationships among all essential actors. Besides monitoring and evaluation systems, it is useful to have also mechanisms to learn, systematize and spread the good practices, in order to promote the repeatability of the program.

Absence of strong competition between seed companies due to lesser number of private seed companies in Nepal has left no options for complete government sector dominance on seed marketing. Further lesser private companies and their no ownership on variety development has made them reluctant to work on seed marketing of newly released varieties developed by government agencies. Private seed dealers, retailers and agro vets are concentrated on marketing of decade old seed varieties despite the fairly good number of new seed varieties. This is because of the risks associated with keeping new varieties as farmers keep demanding for older varieties as they are unaware and unassured of the new varieties potential. This situation will continue as long as more private seed companies are not established on market and there is strong public sector dominance on seed marketing. To alleviate this vicious problem, the government should support for the development of private seed companies by designing tax break system. It should specify on the policy to expand the areas of marketing on at least certain number of remote areas based on potentials of seed companies. It could design special government entity to work solely on marketing of seeds or assign already existing entity to work on promotion and marketing of new varieties released by concerned government agencies so that a broad range of farmers are aware and assured of newly released varieties.

Furthermore to ensure good functioning of the value chain, it is important to promote an informative system which is open and transparent especially in relation to the market, the roles of each actor in the value chain and their respective value added.

In addition, the producers association could establish stable contacts with networks of private retailers in towns, hotels and restaurants, and sell grains and flours on local market. Although at the moment the production is not enough to satisfy the local and national market, some steps to access the international market could be taken. Whilst the international market is not currently a priority due to the limited production, it still represents an aim and an incentive to keep a high quality standard and to improve the different aspects of the production chain. For this reason, several promotional events could be organized so that the Nepalese products could be promoted. The events could be organized in collaboration with NGOs and communities.

POLICY MEASURES

Seed policy affects the involvement and functioning of concerned stakeholders and hence impacts the overall seed sector. The issue of quality seed supply is understood by the government of Nepal and following policies has been initiated:-

Seed Act, 1988 and its first amendment, 2008

The parliament approved a seed act in 1988 to regulate quality seed production. With the promulgation of seed act, the whole seed industry stands on solid foundation in Nepal. Preamble of this act indicates that the act is promulgated to strengthen the provision of seeds and economic status of the general public by catering the quality seeds through a well-planned system of seed production, processing and testing of high quality standards. With the seed act, the NSB is authorized to recommend government on formulation and execution of national policies concerning seeds to ensure the availability of good quality seeds through regular production, processing and marketing. First amendment of the Seed Act in 2008 provisioned for licensing of private seed laboratory, sanctioning private sector to be involved in quality assurance system and issuance of consent from NSB for seed business. The provisions included in the first amendment of the Seed Act, 1988 will enable concerned agencies and seed suppliers to facilitate farmers in increasing seed replacement rate (SRR). It also established a fee structure and service charges of seed testing and certification.

Limitations and Strategies for Intervention

Not being able to provide mechanism to satisfy the rising demand of quality seeds including hybrids and to address the rights of farmers and plant breeder falls under its limitations. Further seed act explains nothing regarding weed seeds. It should specify the kinds of plants whose seeds are for the purposes of this act acts as weed seeds. NSB which takes the responsibility to regularize quality and control of seeds should also prescribe the minimum standards of quality based on purity, germination and disease for seeds. The seed act should explain about the amendment of register of varieties and explain procedures for reviews of cases for seed refusal, suspension, and cancellation. Seed act should make a provision for seeds export. Seed act should also mention about the consideration of application made under the relations to the seed that is available from review or evaluation of seed conducted by the organization, association, or individual researchers or policy experts.

National Agriculture Policy (NAP) 2004

The MoAD has adopted the National Agriculture Policy 2004 with the primary goal of improving the livelihoods of people by transforming subsistence agriculture to a commercialized and competitive system. It has an objective to increase agricultural production and productivity to make Nepal's agriculture competitive in the regional and the global markets through promoting commercialization and competitiveness and conserving and promoting natural resources, environment and biodiversity. The policy promotes the use of hybrid seeds and regular monitoring of genetically modified organisms. It has provision for accrediting private laboratories.

Limitations and Strategies for Intervention

NAP which otherwise should have explicitly prioritized seeds as key input in agriculture has not adequately emphasized the importance of seeds. In order to increase production and productivity, the NAP ensures the supply of seeds based on market demand. For this,

developing and disseminating the efficient seed market information system with joint venture of private, public and local sector is must. Maintaining and updating monthly prices and trend analysis on cereals and vegetables on major market sources and local markets, pre-crisis market information when and where applicable needs to be carried out to secure seed supply. Digitalization of regular information on seed demand and supply, portfolios of seed producers, seed entrepreneurs, seed cooperatives, and community seed banks based on their production potentials needs to be done through government agricultural websites, mobile apps, sms services and newspapers. The NAP proposes to establish and strengthen Agriculture Resource Centers (ARC) on the basis of development regions and geographical sub-regions as special technology service centers for production of quality seeds, seedlings, plants and breeds of animals and plants. This policy mentions that these resource centers will be gradually strengthened and transformed into an integrated center capable of providing services including seed certification besides training entrepreneurs, businessmen, cooperative workers and agricultural workers. The ARC has not been initiated till now. Having a transition to federalism, this center if initiated at the state level, can work for boosting up and strengthening seed production at the local level. NAP has made arrangement for gene banks and encouraged in situ conservation to conserve biodiversity but has failed to explain the linkages to be established between gene banks and in situ conservation like community seed banks for sustainability of conservation of indigenous seeds. The local production, sale and distribution of improved seeds needs to be regulated, and quality should be maintained in their supply as based on policy through effective trainings on capacity building and market based trainings for farmers, seed entrepreneurs and seed traders. This policy has made a provision for agriculture and forest colleges to conduct package program in a coordinated manner related to extension of agricultural technologies in the influence area. This should be implemented in practice by creating certain guidelines based on their institutional capacity and affixing minimum program to conduct annually based on the felt national agricultural needs. Students, professors and researchers should be engaged in new researches for which provision of adequate research funds and research infrastructure should be supported by government and concerned authorities.

National Seed Policy In 1999

National Seed Policy was formulated taking four specific objectives:

1. Availing required quantity of good quality seeds of various crops in efficient manner.

2. Promoting export by producing good quality seeds.

3. Making seed business effective considering the existing world trade.

4. Conserving and maintaining the genetic characteristics of indigenous seeds of Nepal and orchestrating concerned organizations to protect the rights over them.

Limitations and Strategies for Intervention

Seed policy needs to reflect functional and structural dimensions of the seed sector and, therefore, cover a broad spectrum of seed supply chain processes and activities. The policy should incorporate activities from variety development, seed production, seed quality assurance, seed extension, seed marketing, seed import and export, seed enterprise development, seed value chain, seed security, seed standards and capacity building of stakeholders. This should be done by taking into consideration the links and interactions among each activities since all of them need to be incorporated within one national seed system. Seed policies should help stakeholders to understand their clear roles, responsibilities and contributions within defined boundaries, thus facilitating the smooth operation of the sector. Despite its prominent objective to promote export by producing good quality seeds, Nepal has not exported remarkable amount of quality seeds. Global seed trade is not yet considered and our products are not yet competitive to compete with global market. The export policy needs to encourage the production of valuable seeds for export considering the global seed trade so as to raise the country's share of international trade. Very less attention is given on the study and research on the potential uses of biotechnological tools like tissue culture at different levels to produce disease free seeds despite its provision in seed policy. Special packages of program in combination with private sector needs to be initiated for the promotion of these technology. Buffer stocking is not seriously considered despite its clear stand on seed policy. Seed policy needs to explain about strategic seed stocks like on farm seed conservation and community seed banks in appropriate quantities considering the cost and technical manpower for shock monitoring of seeds. Reporting on any abnormal events and reasons at district level or in rural areas which may affect the seed security situation is to be done through establishment of information collection centers. Seed policies needs to provide information on compliance of the national regulatory framework with international standards and regulations. Seed policy needs to explain on building the capacity of research institutes to collaborate with the national seed association and local seed enterprises on finding technical solutions to constraints in seed production, processing and supply. Seed policy needs to clearly define the objective and intended recipients of seed subsidies and include a plan for their gradual withdrawal. Seed subsidies could be combined with other measures for improving farmers' access to complementary inputs or to training in appropriate agronomic practices in order to boost efficiency in food production. Seed policy needs to explain the role of universities to enhance the seed chain which could be done by conducting short courses for both the public sector and local seed enterprises. Further, the effective dissemination of information on seed demand and supply and seed production records of private and public sector to farmer level is lacking. Strengthening of seed monitoring system is vital for overall implementation of seed policy. The benefits of national seed policy needs to be communicated to all sector stakeholders, including farmers, government, the private sector and donors as well as the general public. For this, clear and concise messages can be delivered at media events and seed related meetings or gatherings, through advertisements or notices in local newspapers, and through media releases. Creating awareness of the existence of the policy will help ensure that it is used as reference guide for all seed-related activities. Depending on changes in the seed sector, a periodic review of the seed policy may be necessary after few years to reflect changing trends and to maintain validity and relevance.

Seed Vision

The seed vision aims at increasing crop productivity, raising income and generating employment through self-sufficiency, import substitution and export promotion of quality seeds. The conceptual framework of the seed vision is based on seed value chain including inputs and outputs of the seed chain components. The general objectives of the Seed Vision are as follows-

1. To enhance farmers access to sufficient quantity of quality seeds and other planting materials.
2. To increase seed replacement rate through increased production and supply of quality seeds.
3. To promote local seed security through conservation and sustainable use of agro biodiversity.
4. To create an enabling environment for developing, producing and marketing quality seeds of improved varieties of agricultural crops.

Seed vision envisages increasing the improved seed production by threefold through formal system. It has aimed to assess quality seeds to 10 lakh farm families upon demand prior to planting season. It has foreseen strengthened public and private seed laboratories to have capacity to test and analyse over 40,000 seed samples per annum. It has targeted seed replacement rate to increase at least up to 25 percent for cereal crops and over 90 percent for vegetables. Further, it has expected to increase yield of rice and vegetables by 3.8 MT and 19 MT per hectare respectively and Nepal produced high quality seeds amounting to over 750 MT to have an easy access to export market annually. The Seed Vision will contribute significantly in ensuring food security to poor, women and disadvantaged groups. Realizing the crucial role of trained scientific personnel, seed vision has proposed to increase the number of trained crop breeders from 32 in 2010 to 93 in 2025 both for public and private sectors. By 2025, the cumulative number of crop varieties released is targeted to be doubled, from 232 in 2010 to 423 in 2025. Four hundred twenty-three open pollinated varieties and 60 hybrids will be released by 2025. By 2025, it is envisaged that 40 hybrids comprising, 20 in vegetables, 12 in maize and 8 in rice will be developed and promoted to meet the growing domestic demand and also as an import substitution measure. In addition, 20 hybrids comprising 10 in vegetables, 5 in maize and 5 in rice are expected to be developed and promoted by private sector. The country will be self-sufficient in food crop seeds. Seed Vision framework assumes that incremental output by 2025 will come primarily from investment in inputs for this sector that will bring sustained changes through the development and maintenance of large number of high yielding competitive farmer-preferred varieties and planting materials. The Seed Vision also assumes that there will be a substantial increase in investment on research funds. Seed Vision envisages that credit required for seed growers and seed companies will be made available from credit institutions in the form of soft loans subsidized by the government. 255 thousand people will get additional full time employment upon the implementation. The Government has considered this vision as an umbrella policy in the seed sector and is committed to implement this by developing detailed implementation plan and incorporating the plan in annual programs of concerned organizations.

Limitations and Strategies for Intervention

National Seed Vision has projected the breeder seed production for 2015 as 6.6 mt ton for rice and 32.39 mt of wheat seeds whereas National Seed Balance Sheet depicts demand of 5.5 mt ton of rice seeds and 38.33 mt ton of wheat breeder seeds. Similarly, National Seed Vision has projected the foundation seed requirement for 2015 as 230 mt ton for rice and 582.95 mt ton for wheat whereas the national seed balance sheet depicts demand of 351.3 mt ton of rice and 699.361 mt ton for wheat. The mismatch in breeder and foundation seed requirement between these two documents depicts the haphazard estimation of seeds that will waste resources and hence leads to poor performance of seed sector. This discrepancy should be wiped out and proper estimation of breeder and foundation seeds is to be done based on field level seed requirement. For this collaboration among different government institutions as well as public and private sector is must to ensure sound seed requirement.

National Seed Vision has identified the private sector as major stakeholder and focal point of seed industry development in Nepal. The small seed market structure of Nepal itself sets a limit to the possible private sector's expansion. The structures that is required to promote the private sector's roles in seed industry has not been clearly explained. Private sector with its clear characteristics to function for profit is confined on city areas and on only few commodities. They would not prefer to function in remote areas and be involved in the seed subsystems of minor crops. This secluded approach of the private sector has left no options for the public sector but to continuously remain involved in the production, multiplication and support functions in the seed subsystems. This scenario establishes a competitive environment between the domestic players of seeds. Whereas in an ideal state, the public and private players should supplement each other to achieve concerted effort and develop competitive advantage against the international actors that are receiving more favorable policy environment. The target to release 423 open pollinated varieties and 60 hybrids by 2025 needs special focus on budget allocations for research purposes which otherwise is getting lesser attention. There should be a provision for research fund based on research framework and guidelines. It should be effectively monitored. The seed replacement ratio is to be calculated based on field survey level rather than based on improved seed supply level through formal system in order to get real achievement of increased crop production. Annual progress on seed vision is to be assessed to give this vision a clear direction to achieve its goal rather than assessing over a period of five years.

Agriculture Development Strategy (2015-2035)

With an ambitious plan of spending NRs. 501.8 billion within 10 years, the government has implemented Agriculture Development Strategy (ADS) from fiscal year 2016-17. The ADS, a 20-year vision document with the first 10-year action plan prepared by the Ministry of Agricultural Development (MoAD) in cooperation with 13 development partners has major focus to promote agricultural entrepreneurship. ADS will work on changing the landscape of Nepal's agriculture through profitable commercialization and value chain development. One of its ambitious targets is to halve poverty in less than 10 years through an agriculture-led economy. ADS has vision of making a self-reliant, sustainable, competitive, and inclusive agricultural sector that drives economic growth and contributes to improved livelihoods and food and

nutrition security leading to food sovereignty. Improved agricultural productivity which is at the cornerstone of the ADS has identified the measures to raise agricultural productivity as effective agricultural research and extension, efficient use of agricultural inputs and production based on market demand and food security needs of subsistent farmers. ADS that plays a strong role on effective implementation of existing seed policies including Seed Vision 2013-2025 through sufficient investment in resources and capacity building, resulting in an improved and decentralized seed system providing timely access to quality seed at affordable price. The ADS has ensured the establishment of a high level fully authorized and permanent type of Farmers' Commission to help advance farmers' right. Value Chain Development Program (VADEP) that falls under the flagship program of ADS, aims at developing prioritized value chains through comprehensive and integrated measures along the value chain that result in strengthened value chain linkages, increased public private partnership (PPP) investment and value added with sector impact, and benefits to the poor. Further, ADS is promoting a voucher system for seeds and extension services. The voucher system will empower farmers to make decisions regarding extension services and inputs. Initially this system will be promoted on a pilot basis. Based on the review of performance of the pilot, the system is set to expand and progressively replace the seed subsidies.

Limitations and Strategies for Intervention

Seed market information needs to be available and updated in order to draw more private investments in seeds sector. The greatest challenge that lies in ADS are strengthening capacity of implementation agencies, integrated planning, effective policy monitoring, procurement, and financial management. The farmer commission needs to be established and dialogue, debate and discussion among the concerned stakeholders needs to be done in regular basis in order to assure farmers rights.

A case of Chitwan District.

Location of study

This study involved market visits, interaction with stakeholders working in the rice sector in Nepal, and consultation with farmers, traders and processors. Chitwan district of Terai was selected for the field study because the producer groups and processor of this subsector are mainly concentrated in Chitwan. The ministry has also suggested Chitwan for the field study. Seed producers group and agrovets were selected in consultation with the District Agriculture Development Office (DADO) and MoAD. The input suppliers, producers, small collectors, wholesalers, and processors in the districts were also visited to better identify horizontal and vertical linkage throughout the Value Chain. Further information was gathered by visiting the Crop Development Directorate.

Information Collection

Checklists were prepared in advance to collect information from different market actors. Seed cooperatives were visited and consultation was done with respective chairpersons. Local agro vets were visited and interviews were conducted. Informal discussions were also held with some farmers, agro vet owners, cooperative members, executive members of seed producing coordination committees, owners of Seed Companies, and executives of research stations and retailers to collect information. Secondary sources were also used for the collection of quantitative information. Close coordination and collaboration was maintained with NARC, SQCC and NSCL and SEAN.

Data Presentation

Data on rice prices at value chain levels and commodity quantities are presented in a range because they fluctuate over time. Additionally, there is a price difference between different regions of Chitwan district because of transportation costs. Therefore, data might not precisely capture the trend or pattern to reflect market dynamics. The data is validated to the extent possible with different sources.

Limitations of the study

The following conditions define the limitations of the study:

· There was little time to conduct a detailed value chain study of rice across the entire district.

· It was more difficult to acquire information from processors and exporters than other value chain actors.

· Rice is grown twice in many parts of district rather than a single season crop. This could lead to overestimation of area and underestimation of average yield.

Community seed banks to break seed silence!

Since time immemorial, farmers and their families are following seed saving practice which has allowed them to cultivate a large number of different local varieties that adapts to different environmental stresses. Saving seeds at the national level may not be enough to ensure diversity at local level. In this context, community seed banks can help farmers to access seeds to grow crops during the next planting season or they can be used as an emergency seed supply when their crops are damaged and destroyed.

Community in this sense often has a specific geographic delimitation, such as ward, village, district or a broader geographical area. Community seed banks can best be seen as examples of local level institutions created to address issues of seed conservation, particularly of farmer varieties, and in more recent years, also of seed selection, production, improvement and marketing. Setting up community seed banks may help farmers to get varieties that are adapted to local conditions which otherwise may not be accessible through formal seed systems, may be costly or may suffer from erratic supplies. If farmers, in particular smallholder farmers with poor resources, can access these locally adapted varieties, it can help them to get

access to seeds for the next planting season as well as provide them with an emergency seed supply in times of crisis, thus making them less dependent on the formal seed systems.
Community seed banks will help to preserve seed of the most adapted varieties for the region, either local varieties or new ones coming from breeding programs. The selection of the most suitable varieties for a region needs time and trials with technical support, but after the identification of best varieties, the community seed bank plays a very important role in maintaining the availability of quality seed. Seed diversity is enriched and additional income is generated when seeds are exchanged and sold to neighboring communities. Diversification of crops and varieties is also highly important in terms of people's food security, because it lessens the risk of total production failures and add to consolidating communities' resilience.
CSB members can establish their own rules regarding the operation of the bank. Farmers can borrow seed from the bank as long as they promise to return the same amount plus an additional relatively low percentage during the harvesting period. The selected association can manage the bank with regards to storage, delivery and return of the seeds.
Providing in detail information on community seed banks through systematized extension services to farmers is must. This will increase their knowledge on the importance of saving seeds as well as how to set up and sustainably manage a community seed bank. This will contribute to diversifying and sustainably improving farmers' livelihoods, conserving local varieties, and sharing knowledge and expertise on seeds among farmers. This will help to attain seed security at local level.

Case study of a seed cooperative

Unnat Bij Briddhi Krishak Samuha, a seed cooperative, was established in 5th of Bhadra, 2059 with a view to produce seeds of cereal crops by organizing farmers groups of Patihani under the cereal package program of DADO,Chitwan. Twelve males and three females out of total Fifteen were founding members of this cooperative. This group has got license from National Seed Board, Hariharbhawan to produce foundation seeds from 2064 and has been producing foundation seeds of cereal crops with packaging, tagging and distribution of the concerned seeds.

This is the only cooperative authorised to multiply breeder seeds for the production of foundation seeds of rice, maize ,wheat and lentils, cowpea, rajma in Chitwan. Sabitri, Makwanpur1, Hardinath1, Radha 4, Ramdhan, Samba mansuli sub 1, Sunaulo suganda, Lalka Basmati, Sawa sub 1, Swarna sub 1, Sukkha dhan 1, sukkah dhan 2, sukkah dhan 3, sukkah dhan 4, sukkah dhan 5 and sukkah dhan 6 varieties of rice foundation seeds and certified seeds are produced from their respective breeder and foundation seeds. The seed cooperative is spread on 12 bighas of land with a total cooperatives member of 500. They produce rice seeds in nearby areas as Shibanagar, Patihani, and Jagatpur. Breeder seed multiplication program is distributed on 12 hectares whereas foundation seed covers 300 ha of land for rice.

They have started this cooperatives initially with a share of Rs. 100. Later with the joint investment of Agriculture Engineering Directorate and the group itself, for the construction of the first ever community post-harvest service center, the share has been opened to general public with an objective to widen the structure of this group and expand its services to general

public. This cooperative has its own thresher, storage house and processing machines. This has now increased the share member to 99 with 86 male and 13 female. The 100 Rs share has scaled upto Rs.5000 now. Their average farm gate price of rice seeds is Rs. 43 that fetches a price of Rs. 46 from sale. Makwanpur and Radha 4 fetches price of Rs 42, Sabitri and Ramdhan fetches price of Rs. 46 and Samba Mansuli of Rs 50 and Lalka Basmati fetches price of Rs. 55. The same seeds are taken by NSCL in that price and NSCL gives subsidy on rice as per varieties. Sabitri and radha -4 with price Rs.26 and that Samba and Mansuli of price Rs. 33.

This seed co-operatives has organized rice growers under one umbrella, working with individuals to boost their productivity while building the capacity of growers and taking responsibility for quality control, processing, and marketing.

Limitations and Strategies for Intervention

This cooperative has managed to fulfil the demand of rice foundation and improved seeds within the district. Further, the livelihood of their members are improved with the increased income from seed sale and they are able to get seeds in time making them independent from fluctuating price for seed market. Further, it has provided employment to labors that are required at the time of plantation and weeding. This practice needs to be multiplied and copied to other districts in order to meet the target of reducing rice import and attaining self-sufficiency in seeds.

On visiting farm, I found that there was a surplus of improved seeds treated with Celphos which they receive back from their dealer as it was left un-marketed which they have contracted to supply to a local grain supplier. This tendency of using rice seeds as grain will incur economic loss with associated higher technology and labor force for seed production compared to rice grains. Further, using treated grains will have negative impact on human health. If the same stock appears for foundation and certified seeds, those seeds will either be used as grains or supplied to farmers for grain production. This would demand more breeder seeds that in turn will require strengthened and developed capacity of NARC in terms of skilled workforce, logistics and infrastructures.

This is a matter of policy intervention. Either it should make a law restricting sales of treated seed for grain. Or if to be supplied undergoes series of tests and then supply to market. It should estimate actual seeds required for cultivation based on field survey. Next, it should make a law making it mandatory that foundation seeds be used only for production of certified and improved seeds.

Further this seed cooperative multiply breeder seeds to produce foundation seeds. NSCL has contracted with it to produce certain amount of foundation seeds. NSCL takes back the seeds produced from this cooperative and again supply the same seeds back to the Chitwan district. This two way transportation has added the extra cost on seeds. Instead, NSCL can design the receipt or form which the seed companies and foundation seeds multiplying groups of Chitwan can take and reach to Unnat Bij Briddhi and they can buy seeds from there. Otherwise, NSCL can design a bank voucher system where intended foundation seed buyers can deposit cash on the bank account of NSCL and with the total cash corresponding to the amount, they can get

seeds from Unnat Bij Briddhi. This will reduce the transportation cost and workload of NSCL. Further, it will help in timely getting of seeds. This can be slowly continued to other districts.

Rice sub sector.

Rice is major staple food in Nepal. Average annual consumption of rice per person in Nepal is 78 kg. Short time to cook, higher calories, ease of storage and handling, suitable agro ecological environment to grow and its long shelf life makes it a highly desirable food in Nepal.

Growth of rice consumption in Nepal has been surpassing that of rice production. Between 1963 and 2013, rice consumption in Nepal grew from 1.37% annually compared with growth in production as 1.06 %. Imports increased dramatically to fill this gap. Nepal imported 1122 metric ton of rice seeds only with total amount of NRs. 380233696.

Most of the rice is planted under rain-fed conditions at the month of June-July on which the country receives the highest rainfall of the whole year. The fact that most rice is grown under rain-fed conditions means that there is strong potential for investment in irrigation, development of new location specific hybrid rice varieties for rain-fed cultivation, drought and other climatic stress and develop new location specific rice varieties to plant on April-May season to increase yields.

Rice coverage and production status in Nepal

Rice	FY 2013/2014	FY 2014/2015
Area(Ha)	14,86,951	14,25,346
Production(MT)	50,47,047	47,88,612

Area and Production of Rice in Nepal in Fiscal Years 2013/14 and 2014/15 by AICC 2016

Both the production and area under cultivation has decreased in FY 2014/15 compared to FY 2013/14.

Rice seeds import in 2014/2015

Import of Rice seeds	From India	From China	Total
Quantity(MT)	1092	30	1122
Price(NRs.)	37,47,33,696	55,00,000	38,02,33,696

Import status of Rice seed in 2014/2015 by SQCC 2015.

However the import of seeds was just 977 MT ton in fiscal year 2013/14 with 937 MT ton from India and 40 MT ton from China. The import has increased with the decreasing production and area under rice cultivation in 2014/15 as compared to 2013/14. The projected data for rice seed requirement in 2014/15 was 71000 MT ton, out of which 10650 MT ton has been planned to be imported, but it has already imported 1122 MT of seeds.

Given this potential to expand production, it would seem that there is a good possibility that the growth in the gap between rice consumption and production could be reversed, and that imports would decline, at least in relative terms. But for this to happen, there needs to be more attention paid to post-harvest dimensions of the rice value chain by focusing on the competitiveness of rice produced in Nepal with imported rice in terms of comparative costs as in terms of quality and other dimensions in which these grains compete.

TSR, TSS and SRR of rice in various Fiscal Years

FY	2066/67			2067/68			2068/69			2069/70			2070/71		
Crop	TSR	TSS	SRR	TSR	TSS	SRR	TSR	TSS	SRR	TSR	TSS	SRR	TSR	TSS	SRR
Rice	77064	6768	9.1	77823	7209	9.6	76574	8027	10.5	76576	9135	11.9	71009	9515	13.4

Source- National Seed Balance Sheet, SQCC, 2014/15, NSCL, 2015

A scenario of total seed requirement (TSR), total seed supply (TSS) and seed replacement rate (SRR) has been illustrated to make real understanding of SRR of rice in Nepal. TSR, TSS, and SRR of rice indicates that there is a big discrepancy between TSR and TSS resulting in low SRR for rice in Nepal is cited herewith during five years from 2066/67 BS (2009/10) to 2070/71 BS (2013/14). The figure clearly shows that it needs still much to do with SRR to increase seed transaction. Standard SRR for rice should be more than 25% but in our case it is still below than it by huge difference. Therefore, there is a long way to go to meet the standard SRR of rice for meeting seed security in the country. However, considering the trend of last one decade of SRR in rice, it has increased from less than 3% in the year 2000 to 13.4 % in 2014 and is in increasing order from 9.1% in 2009/10 to 13.4% in 2013/14, indicating a gradual rise of formal supply of quality seeds in the country. If this trend continues to grow, there is a scope to meet the projected target of National Seed Vision-2025 that aims to achieve 25 % SRR for rice.

National Seed Company Limited has sold rice seed of 20755.106 MT ton in fiscal year 2015/16. This is the highest of all fiscal years till now. This justifies that comparatively more attention has been given to deliver rice seeds in this fiscal year.

80 rice varieties has been released in Nepal since 1966. Out of which 12 varieties has been de-notified by SQCC. Average number of varieties released per year from the initiation of breeding program in rice is just 1.4. This shows that recently, farmers' choice of new improved varieties from official released sources is limited to farmers due to slow release and ineffective deployment of the new variety seeds at the farm level.

Similarly, when we use the number of varieties released by the public sector for the given cultivated area of the major food grain crops as indicators of varietal choices to farmers, it comes that there is about 1 variety in each 20,960 ha for rice. This figure is so low to provide ample choices to farmers considering the prevailing huge diversity of agro-ecological situations, production systems and socioeconomic status of the farmers in Nepal.

The pace of registration of crop varieties has surged in the recent decade (2007- 2016). A total of 32 varieties in rice were developed with annual rate of release and registration of 3.2 varieties for rice. However, none of the rice varieties has been registered since 2011. If this situation persists, the target of seed vision to release 13 rice varieties by the end of 2025 would be collapsed.

A recent National Seed Balance Sheet of 2015/16 indicated a demand of 5755 kg of breeders seed, 351.3 MT ton of foundation seeds from area of 6260.3 ha. Out of this, only less than half of the officially released varieties of rice seeds are in demand for source seeds in the country (SQCC 2015).

A recent IRRI-NARC led household survey findings of rice crop under STRASA and TRIVSA projects in Nepal revealed a prevalence of older varieties with 12 years of adoption lags and 18 years of weighted varietal age in Nepal (Gauchan et. al., 2012, Gautam et. al., 2013, Velasco et. al*.,* 2013). The dominant rice varieties in farmers' fields during 2011-12 survey were Radha-4 (released in 1994), Sabitri (released in 1979), Mashuli (released in 1973) and Khumal-4 (released in 1989). The seed sales data based on nationwide dealers survey (Gauchan et al, 2014) and source seed demanded in national balance sheet for the last three years (2013, 2014, 2015) also indicates similar pattern (SQCC, 2015) .This happens since seed companies and most of the community sectors are producing and multiplying seeds of dominant old varieties because of their familiar cultivation practices, high market demand, high profit margin, and low risk of marketing and poor access of new competent varieties and the assurance of new varieties to yield more due to poor extension services in seed chain.

The imported hybrids in rice constituted about one twentieth of the total formally supplied seeds in rice in 2015 (SQCC, 2015; NSCL 2015). This results because of poor incentives for source seed production and marketing, minimal varietal options for different agro-ecological regions and socioeconomic status of farmers, lack of efficient pro-market estimation and inefficient seed planning mechanism.

None of the rice seeds are exported formally. However it has been reported that seeds of rice like Radha-4 goes to India through porous border especially from Nepalgunj, Bhairahawa and Krishnagar check point. The reasons for preference of those rice seeds has been their better quality of making beaten rice "chiura". If there is potential of processed products in Indian market, there is a need to concentrate on such products and export can be promoted. However, the illegal trade needs to be checked by having special supervision on border areas.

Nepal has to consider comparative advantage in rice production in competition with imports, and that comparative advantage seems to be growing given the price increases for bygone years. Furthermore, when processed, rice gives off several useful by-products, which can be used in the animal feed, breweries, paper industries and many other industries. This lowers the price of milled rice to consumers. The inter linkage between various stakeholders in rice chain is to be considered to boost up existing rice seed chain.

Case study of seed act and policy of different countries

CANADA

Seed act of Canada has prescribed the minimum standards of purity, germination, quality and disease for seeds. It has specified the kinds of plants whose seeds are, for the purposes of this Act, weed seeds. The act has mentioned about the issuance of certificate or other document setting out any information it considers necessary to facilitate the export of any seed. Seed act has mentioned about the consideration of information in considering an application made under the regulations in relation to seed, the Minister may consider information that is available from a review or evaluation of seed conducted by the government of a foreign state or of a subdivision of a foreign state or by an international organization, or association, of states.

INDIA

India seed policy of 2002 has considered tax rebate/concessions on the expenditure incurred on in-house research and development of new varieties and other seed related research aspects. Private Seed Sector has been encouraged and motivated to restructure and reorient their activities to cater to nontraditional areas. The Seed Crop Insurance Scheme has been provisioned so as to provide effective risk cover to seed producers and has been extended to all traditional and nontraditional areas covered under the seed production program. Seed growers have been encouraged to avail of Seed Crop Insurance to cover risk factors involved in production of seeds. Seed Banks has been set up in non-traditional areas to meet demands for seeds during natural calamities.

LEARNING FROM INDIA: POLICY EFFECTIVENESS INDEX

India has adopted the study of Policy Effectiveness Index (PEI) in order to measure the performance of its States in isolation and in comparison with each other over time. This index looks at development in terms of securing a broad-based notion of human wellbeing wherein the success of policy measures to attain corresponding outcomes or development goals are assessed. The Index also encourages a culture of evidence-based policy making, presents a framework for policy effectiveness for a developing country and supports periodic assessment of policy outcome. The outcomes of the study has been presented in the recent Indian Public Policy Report (IPPR) which has pointed out several issues that need to be addressed in order to improve the policy-making process.

RECOMMENDATIONS

- Dialogue, debate and discussion among the concerned stakeholders on frequent basis is must to overcome the absence of clarity among policy makers on the underlying implications of the policies they formulate.
- Focus should be on processing and storing rather than mere supply of seeds to increase the value on the products, to provide small holder farmers the opportunity of being independent from the often fluctuating price of season agricultural products, create new and different employment opportunities which often favor marginalized and poor farmers. Diversifying the products harvested from field into dynamic products.
- Certain metrics like Policy Effectiveness Index should be designed in order to evaluate the implementation aspects of policies and acts such that periodic reviews and amendments can be conducted.
- Marketing as well as awareness programs for newly released varieties should be conducted through a special institution until there is strong existence and competition of private profit oriented seed companies.
- Necessary steps to access the international market needs to be taken. Though the international market is not at present a priority because of inadequate production, it still epitomizes an aim and an incentive to keep a high quality standard and to improve the different aspects of the production chain.

REFERENCES:

1. Agriculture Development Strategy 2015-2035. MoAD, GoN

2. Briefing paper. The value chain as a tool to fight against poverty: The analysis of two practices. May, 2013. www.oxfamitalia.org
3. Draft guide for national seed policy formulation, 15-19 April, Rome.2013. Presented to the Working group Commission's Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture. CGRFA14/13/Inf.20
4. Elizabeth Cromwell, Esbern Friis-Hansen and Mick Turner. The Seed Sector on Developing Countries : A framework for performance analysis. July 1992 .ISBN 0 85003 183 4
5. Engaging Smallholders in Value Chains, Programme Insights, Oxfam GB. April, 2011.
6. FAO-CDMDP, 2010. Seed Value Chain Analysis as a means for Sustainable Seed System: A case of farmers based seed production and marketing in Arsi Zone, Oromia Region
7. Mahendra P. Khanal. Seed Quality Assurance and Marketing.
8. National Seed Vision 2013 – 2025 : Seed Sector Development Strategy, Ministry of Agricultural Development, Government of Nepal.
9. Oren L. Justice and Louis N. Bass. 1978. Principles and practices of seed storage.
10. Pradeep Man Tulachan, Md. Khairul Bashar, Md. Rafiqul Islam, Debashish Chanda, and Christian Portal. 2012. Value chain analysis of rice seeds in Bangladesh. Los Baños (Philippines): International Rice Research Institute. 46 p.
11. Proceedings of the Regional Technical Meeting on Seed Policy and Programmes for the Central and Eastern European Countries, Commonwealth of Independent States and other Countries in Transition. Budapest, Hungary, 6-10 March, 2001.
12. Ranjit Kumara, Khurshid Alama, Vijesh V. Krishnab and K. Srinivasa Value Chain Analysis of Maize Seed Delivery System in Public and Private Sectors in Bihar.
13. Report of the Expert Consultation Workshop on Seed Policy Formulation, Milan, Italy. FAO, 2011.
14. Seed act of Canada. http://laws-lois.justice.gc.ca
15. Shrestha P., R. Vernooy and P. Chaudhary. 2013. Community Seed Banks in Nepal: Past, Present, Future. Proceedings of a National Workshop, LI-BIRD/USC Canada Asia/Oxfam/The Development Fund/IFAD/Bioversity International, 14-15 June 2012, Pokhara, Nepal.
16. State of the evidence: Seed policy reform. USAID.
17. Statistical Information on Nepalese Agriculture 2013/2014. Published by Agribusiness Promotion and Statistics Division, MoAD, GoN, December,2014.
18. Statistical Information on Nepalese Agriculture Time Series Information 1999/2000-2011/2012. Agribusiness Promotion and Statistics Division, MoAD, GoN, July, 2013.
19. Stryker J. D. Developing competitive rice value chains. Second Africa Rice Congress, Bamako, Mali, 22–26 March 2010: Innovation and Partnerships to Realize Africa's Rice Potential.

20. Thompson, J.R. (1986). An Introduction to Seed Technology. New York, John Wiley and Sons.
21. Tinsley, R. Rice Value Chain Analysis – Sokoto State Nigeria (NIG 244), June, 2012.
22. Value chain/ market analysis of the lentil sub-sector in Nepal. August, 2011. USAID. Contract No. EEM-I-00-07-00008, AID-367-TO-11-00001
23. Wilcock, David C., and Franco Jean-Pierre, "Haiti Rice Value Chain Assessment: Rapid diagnosis and implications for program design," Oxfam America Research Backgrounder series (2012 http://www.oxfamamerica.org/publications/haiti-rice-value-chain-research.