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AGRICULTURAL EXTENSION IN NEPAL: EXPERIENCES AND ISSUES

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ABSTRACT

A detail study on the experience of agricultural extension in Nepal was done by discussion with experts, academicians and involved agricultural officers of Nepal along with review of different documents, books and articles on the subject matter. Since from the first effort of extension service, Training and visit, Integrated Rural Development Approach, Tuki Approach, Farming System Research and Extension Approach, Block Production Program were the approaches used in the past. Conventional Educational Approach, Pocket Package Approach, Projectization Approach, Farmers' Group Approach, Farmers Field School Approach, Partnership Approach are the approaches being followed presently in agricultural extension in Nepal. The extension efforts in the country are guided by the National Agricultural Extension Strategy. Department of agriculture under ministry of agricultural development is responsible for providing public extension service via District Agriculture Development Office (DADO), Agriculture Service Centre, Contact Centre, Model Agriculture Service Centre and Community Agriculture Service Centre at the farmers level. Farmer's Group and cooperatives, International and National Nongovernmental organizations, Community Based Organizations and few private entities are providing the private extension services. major issues found in public extension systems are lack of motivation among the rural youths, farmers; natural resource degradation and climate change and sustainability issues; inadequate number of the extension workers and their qualification and skills; inadequate infrastructure and capacity for use of ICTs among the ground level extension workers; lack of monitoring and assessment of impact of extension activities in rural farmers; low level of need based extension coverage particularly for small farmers; ineffective and weak linkages between stakeholders at different levels; low level of education of farmers; insufficient budget and investment for extension activities; domination of supply driven approaches rather than demand driven; inadequate extension services in parts of value addition and market exposure.

Indexing terms/Keywords

Agricultural Extension, Nepal, Experience, Issues

Academic Discipline And Sub-Disciplines

Agriculture, Agricultural Extension

INTRODUCTION

The agricultural development is the fundamental for sustainable development and poverty alleviation in the developing countries. (World Bank, 2008; World Bank, 2010; Ruane, 2011 ; Benjamin, 2013). Besides being the primary source of food and contribution in the household economy, agriculture holds major share in providing the raw materials for industries and the national economy too. Increased productivity, increase in farm incomes and fueling the linkages between farm and non-farm poverty reduction programs are the consequences of agricultural growth. (Timmer, 2005; World Bank, 2008; Ruane, 2011). According to DFID, 2005; World Bank, 2008 ; International Finance Cooperation, 2010, 86% (2.5 billion people) of the rural population in developing countries directly depends on the agriculture sector. The major proportion of the population of developing countries is the rural farmers. The income from agriculture is the major source for satisfying their health and educational needs. Timmer, 2005; Sachs, 2006; World Bank, 2008; Global Hunger Index, 2010). Timmer (2005) argues that for any country to attain the sustainable development, raising the agricultural productivity is the must. Similarly World Bank (2003) focus on viewing the agricultural policies geared towards small scale, low productivity farms as the primary function in poverty reduction attempts instead of embedding them in agricultural development programs. The extension services in developing countries are primarily focused in crop production and management issues (Sandhu, 1993; Qamar, 2005; Butt *et al*., 2005; Luqman *et al*., 2007; Shah *et al*., 2010). Taking the objectives of enhancing farmers' technical knowledge, farm management skills, and effective information system in the extension services for agricultural development will in long run results improved production, increased economic return and amplifying to the national and global economy (Schiff and Valdes, 1995; Byerlee, 2000; Bernet *et al*., 2001; Majid and Anwar, 2000; FAO, 2002; Rogers, 2003; World Bank, 2010; Benjamin, 2013). The concept of the agricultural extension services is focused on promoting the agricultural production through supporting the farmers to enable them to address their farm problems of production and marketing and ensuring the sustainable agriculture development. (Benor *et al*., 1984; Roling, 1990; Chambers, 1995; FAO, 2002; Rogers, 2003; Hu *et al*., 2009).

AGRICULTURAL EXTENSION SERVICES

The conventional, top down type philosophy lacking the account about the diversified ground situations and farmers' needs in an era of rapid marketization is the common feature of the extension services in most of the underdeveloped and developing countries (Adhikari and Suvedi, 2000; FAO, 2010; World Bank, 2010; Hu *et al*., 2009; AL-Sharafat, 2012; Siddiqui and Mirani, 2012). The characteristics like poverty, illiteracy, short of basic farm implements, and dependent on purchased extension services and inputs leads the small farmers in the category of most disadvantaged and vulnerable in developing countries (Sachs, 2006; World Bank, 2008 ; Riaz, 2010). A poor service delivery mechanism, lack of adequate personnel and a shortage of the required equipment (Benjamin, 2013); arrogant and untrained extension officials, lack of transportation (Chambers, 1995; Qamar, 2005; World Bank, 2010; Ghosh, 2012), etc. also results in the low use of

technologies and extension services. The agricultural extension services and interventions are unable to achieve the goals, in intervening the most disadvantaged and vulnerable farmers in developing countries (Sachs, 2006; World Bank, 2008).

According to Hagmann *et al*., 1999; FAO, 2002; Rogers, 2003; World Bank, 2010 the indicators of effective agricultural extension services can be enlisted as in Table 1. .

Table 1: Key indicators of effectiveness of agricultural extension services

Parameters/indicators	Complex variable	Simple variable
'Decentralized system'	Involvement of the key stakeholders ensured	Policy makers, project managers, extension workers, subject specialists, researchers, and farmers, particularly the smallholders
Linkages	Institutions and farmers	Effective coordination among extensionists, subject matter specialist, research matter, and farmers (especially resource poor farmers)
Need based approach	Extension services designed according to the needs of majority of farmers	Programs and projects implemented according to the farmers' needs and problems faced.
Participation	Farmers utmost participation is ensured in the programs and projects	Farmers involvement in: Problem-solving, decision-making, implementation, monitoring and evaluation
Fortnightly and monthly programs	Visits, trainings and meetings, workshops and exposure	Trained farmers, equipped with crop management skills and techniques towards improved production, yield and income
"Diffusion of innovation"	An innovation is communicated through certain channels, according to social system and or locational characteristics, national laws and policies, ("Meso") and international laws and policies ("Marco").	Attitude changed; change in practices from traditional to appropriate use of technology, information, knowledge, pesticides and fertilizer, which eventually lead toward improved production, yield, income and socio-economic conditions.
Documentation	Regular record keeping by extension worker, monitoring and evaluation	Information and key findings sent to policy makers for necessary actions.

Sources: Hagmann *et al*., 1999; FAO, 2002; Rogers, 2003; World Bank, 2010; Baloch and Thapa, 2017)

Ineffectiveness in enhancing the farmers' technical skills, disseminating technology, information (i.e., market, business, available opportunities and potential); and accessing the rain-fed areas by the extension services were the summary of many studies carried out in several developing countries. This was due to inadequate resources like manpower and budget, transportation facilities, geographically vast and scattered areas, and untrained extension workers and the top down approach (World Bank, 1984; Anderson *et al*., 2006; Eicher, 2007; World Bank, 2010). Though the efforts of the government are seen, the results show that under a centralized system, the smallholder farmers/resource-poor farmers or the majority of the farmers had not equally benefited from those services. The agricultural production as well as the farm household and the national economies, both are affected primarily because of the negligence on smallholder farmers' problems and concerns (Baloch and Thapa, 2017)

AGRICULTURE IN NEPAL

Agriculture is one of the major occupations of the people residing in the South Asian region. The farmers are now gradually diversifying their system of agricultural production, in favor of high value commodities, viz., fruits, vegetables, livestock and fisheries. Price policy, markets and road development, urbanization and technological improvements is influencing this diversification (Joshi *et al.,* 2004). This has highly benefitted the areas of rainfed farming where the high value crops have replaced the coarse cereals. Simultaneously this have also contributed in employment generation, increased economic flow and raising the living standards of the small and medium farmers (Joshi *et al.,* 2004).

Agriculture is the major foundation of the national economy with one third share in the nation's GDP and employing two thirds of the population but itself heavily depending upon the annual monsoon rain (Investment Board Nepal, 2016; FAO, 2017). The growth rate in agriculture sector was static at 2.41% between 2011/012 and 2015/16. There is a great pressure over productivity over the last five decades due to the increased population growth. One result of this pressure has been a decrease of the average size of land holdings from 1.1 hectares to 0.7 hectares. Nepal imported agricultural products worth $1.298 billion in fiscal year 2013/14, while the exports amounted to only $ 268.91 million (Investment Board Nepal, 2016).

Nepal is richly artistic with agro-biodiversity and the farming system is mostly integrated with livestock. Rice, maize, millet, wheat, barley, buckwheat are the major staple food crops and oilseeds, potato, tobacco, sugarcane, jute and cotton are the important cash crops whereas lentil, gram, pigeon pea, blackgram, horsegram and soybean are the important pulse crops. Orthodox tea, large cardamom, turmeric and zinger too are some attractions to get around against erratic and uncertain weather and other unfavorable agronomic conditions (FAO, 2017). In addition to livestock production as other economic activity, farmers are involved in growing a number of fruit and vegetable crops like apple, peach, pear, plum, walnut, orange, lime, lemon, mango, litchi, banana, pineapple, papaya, cucumber, lady's finger, brinjal, pumpkin and several leafy vegetables (FAO, 2017). Plain terai is endowed with fresh water fish culture enterprise whereas rainbow trout in the hills and in the lower mountains.

The climate of the region varies from high snowy mountains to dry plains and climatically all the areas are not very ideal for farming. In the past many agricultural programs were initiated to gain food security, ensure self-sufficiency and improve rural livelihoods in the country but still the achievements is uncountable.

Historically, small scale agriculture was practiced by the rural population with their own efforts in the rural areas. Serious efforts on the development of agriculture with the objective of food security were initiated in 1950s. However, agriculture received attention first time in the fifth development plan of the country (NPC, 1975). Major efforts in agricultural extension contributing to the development of agricultural sector can be taken as the efforts of the department of Agriculture.

The Department of Agriculture bears overall responsibility for the growth and development of agricultural sector, which has offered employment to over 66 per cent of the economically active population and made a remarkable contribution of 34.5 % in the GDP with 13 percent of the total foreign trade of the country (Economic Survey, 069/70). Keeping in view of the contribution, the agriculture sector was given priority for its development from the beginning of the periodic plans. In this background, the major objective and challenge of department of agriculture is to reduce poverty and to support the development of non-agricultural sectors through high growth in agriculture. The department of agriculture in Nepal has its broad objective of supporting and helping to achieve food security and poverty alleviation by the transformation of agriculture through diversification and commercialization. Specifically, the objectives are to increase agricultural production based on geographical diversity; to support food security by increasing food production and maintained the internal supply of food stuffs; to increase the production and productivity of raw material for the agro-industries; to support the produces those have comparative advantages appropriate market management; to increase the availability of off-farm employment by supporting small industries and enterprises; to support export promotion and import substitution of agriculture; to support fight poverty alleviation by increasing the opportunity employment for small, marginal and women farmers; to screen and standardize the technologies by doing adoptive research and to strike balance between agricultural development and conservation (DOA, 2017).

SHORT REVIEW OF EXTENSION APPROACHES

1. Approaches adopted in the past

(i) **Training and Visit System:** With assistance of the World Bank and implemented in twenty-three districts of the country, the approach was well accepted in the beginning as a means to expand extension coverage. The concept of training the farmers and extension workers and a time bound schedule of visits to the farmers passing the technological recommendations was worth working. This approach was implemented from 1975 until 1989 (Basnyat, 1990; Thapa, 2005). As implementation progressed but faced with the problems like costly to sustain in terms of both financial and human resources; repetition of messages regarding the technical recommendations only; emphasis on production aspect only but missing the aspects like postharvest and agribusiness activities like value addition, input, credit and marketing, etc.; lack of motivation and regular supervision; and poor communication infrastructure in the hilly areas, etc., the service became weak and could not be continued (FAO, 2010; Sharma, 2011; Dongol, 2004)

(ii) **Integrated Rural Development Approach:** The decades of 70s and 80s were the period when this approach was implemented in almost all the administrative zones of the country. The concept was to boost agricultural production and productivity with improved supply of inputs, better extension services support and infrastructural development to uplift the rural standards of living (Sharma, 2011; FAO, 2010; Dongol, 2004). The existing conventional system was supported with the additional temporary manpower, supply of production inputs, construction of Agriculture Service Centers and additional fund for services and focused on the intensity to implement the extension interventions. Discrimination among the manpower on allowance, conflicting and varying rules and working guidelines by different line ministries, unclear line of command for reporting by the extension workers were the major shortfalls of this approach. Grass roots level extension infrastructures like ASC buildings, market yards, trails, rural roads and small irrigation schemes proved to be of worth and some of them are still useful today. Also lack of the technology for all categories of farmers was the realization (FAO, 2010; Dongol, 2004; Thapa, 2005; Sharma, 2011).

(iii) **Tuki Approach:** The approach was introduced under a Swiss-assisted Integrated Hill Development Project in 1977 AD. The system did not generate new technologies but relied on technologies developed by commodity research programs and screened through the adaptive trials (Dongol, 2004; Thapa, 2005; Sharma, 2011). A trial

in the farmers' field by distributing a packet of seed and fertilizers and sharing the results to test their suitability in the local condition was one of the activities (Dongol, 2004; Sharma, 2011). Farmers' trainings, addressing the needs with respect to improved agricultural inputs; disseminate information and training the neighbors; demonstrate new technology; and understand his own capacity and those of the agencies helping the farmers were some of the specified activities of the extension workers. The system was implemented with the recruitment of volunteers (the *Tukis*) after an intensive 15-days long progressive farmers training. They received four trainings in a year before the agriculture seasons, maintain their own model farms, and distributed agricultural inputs to farmers and who were also interested to interact with neighbors regarding modern farming issues, participating in a seed multiplication program. The approach established as a complementary with the conventional extension system by the Department of agriculture by functioning in providing inputs which was often a missing component in the conventional work (FAO, 2010; Dongol, 2004; Thapa, 2005; Sharma, 2011; Basnyat, 1990). The system, however, did not expand beyond the two project districts, and the operation, if linked to modern input suppliers, in partnership with extension and research organizations, some of the volunteers could perform as private sector inputs providers with a successful enterprise to support effective extension services delivery (FAO,2010)

(iv) **Farming System Research and Extension Approach:** Farming Systems Research and Extension (FSR/E) project was initiated as a single umbrella to integrate research and extension by generating technology in the research outreach sites with the participation of farmers availing inputs locally and expansion of the adoption of proven agricultural technologies within the Extension Command Area (ECA) in the hill districts under a Department for International Development (DFID) assisted project, in the Lumle Agriculture Center (LAC) and the Pakhribas Agriculture Center (PAC). Later the project extended partnership with the T and V System in the hills but the coordination and linkage was weak due to differences in management aspects in separate projects funded by different donors. The extension service under the project established good contact with farmers but could not become sustainable because of the high extension cost (Dongol, 2004; Thapa, 2005; Sharma, 2011; Basnyat, 1990).

(v) **Block Production Program:** Under a USAID supported Integrated Cereals Project (ICP) the Block Production Programme (BPP) was implemented with the concept of increasing production and productivity by integrating and concentrating complete packages of production practices in a particular commodity (Sharma, 2011). Started in 1982, the approach was tested in the two Terai districts and later was expanded to the entire Terai and to some hill districts with the government funding. Originally, the block consisted of 1 000 hectares of contiguous plots but was later changed to 100-hectares sub-blocks when the pre-requisites were not available for larger size "blocks". The BPPs covered 1,10,000 ha consisting of about 78,000 farm households in 28 districts (Dongol, 2004; Thapa, 2005; Sharma, 2011; Basnyat, 1990). Neglecting the participation of private sector the program relied heavily on public sector support for inputs, credit, irrigation, technical recommendations, and marketing. Later networks and linkages among stakeholders (such as input and credit suppliers, etc) were found to be weak because of the lack of the organizational resources to match with the required extension coverage. The approach was also bias towards large and resource-rich farmers who had large farm sizes with irrigation facilities and afforded purchased inputs and was highly criticized by farmers devoid of services. The approach was costly in terms of financial and human resources compared to the nationwide conventional approach (FAO, 2010; Thapa, 2005; Sharma, 2011)

2. Approaches at present

(i) **Conventional Educational Approach**- Besides the group members, this approach involves the key farmers in the process of motivation and education. The farmers themselves in a wider area disseminate the knowledge and skills taught to them. This approach has been effective to facilitate the adoption of new innovation by interested farmer, which eventually radiated demonstration effect to neighboring farmers (Sharma, 2011; Dongol, 2004).

(ii) **Pocket Package Approach**- Pocket package approach refers to the production strategy on pocket area basis. The feasible pockets for a certain commodity are selected and then a project is developed through bottom up process. This has been positive to introduce the package of technologies as demanded by pockets. It has also helped to develop the crops/commodities on commercial scale (Dongol, 2004; Thapa, 2005; Sharma, 2011).

(iii) **Projectization Approach**- Every commodity based production program has been implemented on the basis of Project-designed within the framework of time duration, budget expenditure and expected output. Package of activities which are required to achieve the output are identified and included in the Project. This approach has been adopted in all the 75 districts with a priority in the production pockets (Sharma, 2011).

(iv) **Farmers' Group Approach**- The principle is to put the farmers of same interest together and carry out the activities on group basis. This has been very effective to bring the innovation to the groups, which in turn

expand to its command area farmers. The limited manpower and other resources can be well utilized by means of group (Dongol, 2004; Thapa, 2005; Sharma, 2011).

(v) **Farmers Field School Approach**-This is based on the principle of adult learning. This has been very effective approach in reaching farmers and helping them to have an access to the knowledge and skills required for crop management. This approach is becoming popular because of its democratic and participatory process (Sharma, 2011).

(vi) **Partnership Approach**- Government organizations is undertaking partnership approach with other organizations like Department of Irrigation, NGOs, CBOs, Private Organizations, etc, to deliver the extension services effectively. This strategy has encouraged relevant stakeholders to join hands in development (Sharma, 2011).

Table 2: Comparative study of the different extension approaches adopted in Nepal.

S.N.	Particular	T&V	IRDP	Tuki	FSR/E	Conventional	Block Production
1.	Relevancy of technology recommendation	Low	Low	Low	High	Low	High
2.	Agent Client Ratio	1:1621	1:1244	1:1154	1:451	1:1270	1:192
3.	Research Extension Linkage	High	Poor	Medium	High	Poor	Medium
4.	Coordination	Low	Low	Low	Low	Poor	High
5.	Contact cost by JT/JTAs (Rs)	3.59	2.13	7.69	8.74	6.37	7.59
6.	Information flow	Effective and Rapid	Effective and slow	Ineffective	NA	Ineffective and slow	Effective and Rapid
7.	Visit to Farm	High and Scheduled	Low and non-scheduled	Non Scheduled	Non Scheduled	Low and Non Scheduled	Non Scheduled
8.	Technology Generation	No	No	No	Yes	No	Yes
9.	Competency of workers	Low	Low	Low	NA	Low	High
10.	Privatization of inputs	No	No	Yes	Yes	No	No
11.	Training of field staff	Regular and Scheduled	Irregular and Non-scheduled	Irregular and Non-scheduled	Irregular and Non-scheduled	Irregular and Non-scheduled	Irregular and Non-scheduled
12.	Clarity in job description	Yes	No	Yes	Yes	No	No
13.	Supervision and Monitoring	Yes	No	No	Yes	No	Yes

Source: Sharma, 2011; Dongol, 2004

NATIONAL AGRICULTURAL EXTENSION STRATEGY

Nepalese agricultural extension services which is now at the edge of transition from production focused to people focused, from hard systems thinking to soft systems thinking and from transfer of technology types of approaches to that of participatory approaches which are driven by the ethos of participation and put people at their centre. With the devolution of agricultural extension function to the local elected bodies (District Development Committees) as per the spirit of the Local Self Governance Act 1999 (LSGA), the Ministry of Agricultural Development has formulated National Agricultural Extension Strategy (NAES) consistent with the LSGA, APP, national agricultural policy and national periodic plan. The work was initiated by the World Bank supported Agricultural Research and Extension Project (MOAC 2007; Sharma, 2011).

NAES was formulated with the mission of the efficient and cost-effective need-based participatory delivery of agricultural services, prioritized and targeted to the needs of different categories of farmers, particularly focused on small, poor and deprived. The overall objective of the strategy is to reform and reorient public sector agricultural extension service in order that it will strengthen decentralized agricultural extension services and ensure the access of the poor, deprived and socially excluded to the agricultural extension service (MOAC 2007; Sharma, 2011).

i. **Public Level:** There are various service delivery institutions to ensure the agriculture service delivery to meet the need and demand of the farmers in Nepal. Following are the agriculture extension service delivery institutions in public level.

- **District Agriculture Development Office (DADO):** District Agriculture Extension Offices (DADOs) are the service providing organization at district level regarding agriculture sector. Likewise, District Livestock Offices (DLSOs) are concerned with delivery of extension services on livestock.
- **Agriculture Service Centre:** The Agriculture Service Centres (ASCs) are the grass root institutions to provide the agriculture extension service that work closely with the farmers. As the numbers of ASCs are limited, some supplementary provisions have been made to provide the services for the farmers. These include:
  - ✓ **Contact Centre:** DoA provided flexibility to districts to establish contact centers to effectively utilize the existing physical resources such as Agriculture Sub-Service Centers as well as demand of VDCs.
  - ✓ **Model Agriculture Service Centre:** The concept of model service centre was put to increase the efficiency and implement the service delivery with improved effectiveness so that it could be internalized in other service centers. Priorities have been given to improve the physical condition and equip with essential facilities. Such model service centers have been established in one district in each development region.
  - ✓ **Community Agriculture Service Centre:** The concept of Community Agriculture Service Centre (CASC) has been put with the objective of making service delivery more inclusive as well as to help commercialization in agriculture through best utilization of local resources and skills of local individuals. The model emphasizes the participation of farmers groups and cooperatives in the management and implementation of program at service centre level to make service more responsive and client oriented.
- **Farmer's Group and cooperatives:** The supply of extension services is maintained through the farmer's group and/or cooperatives. This help to make every farmer equally responsible in activities and accessible to extension services.

ii. **International / National Nongovernmental organizations (I-NGOs):** There are ten thousand nongovernment organizations involved in community and rural development sector. I-NGOs have played very significant role in Nepalese society in a number of ways including successfully arousing consciousness and making advocacy of/for a number of developmental issues and other global democratic values (good governance, civil society, globalization, privatization, liberalization, transparency, responsibility, participatory democracy and development, decentralization).

iii. **Community Based Organizations:** There are many forms of community based organizations in Nepal. They are in the form of mere farmer groups to well organized structures such as federations, forums, networks, cooperatives, and so on. The CBOs are generally:

- Θ Non-profit;
- Θ Relies on voluntary contributions;
- Θ It acts at the local level; and
- Θ It is service-oriented.

ISSUES REGARDING TO PUBLIC SECTOR AGRICULTURAL EXTENSION

In Nepal, agricultural extension is dominated by the activities of the two departments under the MoAC- the Department of Agriculture (DOA) and the Department of Livestock Services (DLS).

Despite many encouraging evidences with regard to the performance of public sector agricultural extension in the past, Nepalese public sector agricultural extension is often criticized for its strong technology transfer and seemingly failure to contribute to sustainable agricultural growth.

Domination of supply driven approaches rather than demand driven; failing to cater the needs of the specialized client; demand for location specific extension services as required by the commercialization of agriculture; high cost- low impact of extension programs; insufficient face-to-face contact between extension worker and farmers; inadequate funds for operational purpose; inadequate personnel and technical qualifications of grassroots extension workers; dilution of impact by thin coverage, etc are the problems often noted with regards to Nepal's public sector agricultural extension. Along with these, some of the major issues in Agriculture extension services in Nepal are discussed as follows:

1. **Lack of motivation among the rural youths, farmers:** The outmigration of the young and energetic age group is the major problem in Nepal. The lack of labor force leads to increase in per unit production cost. Among the rural youths, there is no any respect towards the profession of agriculture. Youth's insufficient access to agricultural knowledge, information and education is the major challenge identified hindering the young generation to be attracted towards agriculture. Limited access to land, inadequate access to financial services, difficulties accessing green jobs, limited access to markets, limited involvement in policy dialogue, etc are the challenges in strengthening youth's involvement in agriculture (FAO, 2014). Addressing these challenges will help in increasing youth's and young farmers' involvement in the agricultural sector, and ultimately addressing the significant untouched potential of this sizeable and growing demographic. In country like Nepal, facilitating the youth cohort's participation has the potential to drive agriculture towards development.

2. **Natural Resource degradation and climate change and sustainability issues:** Open natural resources such as land and forest are the main sources of livelihood for a large proportion of the population. Environmental and natural resource degradation is a very big problem in Nepal. Poor agricultural production is intimately related to environmental degradation and loss of biodiversity. The fast population growth has led to a rapid increase in demand for fuel wood, timber, fodder and land to grow more food. Forests were cleared and converted to agriculture (Soussan *et al*. 1995) and the process is ongoing. Landslide is another contributing factor of environmental degradation. Seventy-five percent of the landslides in Nepal occur naturally (MOPE, 1998) ultimately leading to natural resources degradation. The causes of environmental challenges in Nepal are collection of firewood, grazing, deforestation, environmental pressure from tourism, pollution from factories, fishing using explosives and poison, hydropower plant construction, flooding, siltation, unscientific waste disposal, excessive human encroachment, High population pressures and prevailing poverty, lack of integrated land and water use planning, inadequate coordination, inadequate data and information management and inadequate policies and strategies for environmental protection. (Chhetri and Shakya, 2016)

3. **Inadequate number of the extension workers and their qualification and skills**: The ratio of extension worker to client is very low. An extension worker needs to reach upto a large number of clients. The factors like human capital status of extension workers, exposure of extension officers to management, marketing, training and infrastructure development are the major issues in delivering the effective extension services. In accordance with the human capital theory (World Bank, 2007), Education and Agricultural Education and Training (AET) are the major factors influencing agricultural productivity through enhancing farmers' ability to choose optimum combinations of farm inputs and farm outputs, by uplifting the farmers' ability to acquire and adapt new technologies, thereby reducing innovation time lags, fostering the capacity to exploit new market opportunities (Idachaba,1997; Atchoerena and Gasperini, 2003), affecting performance and success through enhanced worker productivity. Since the aged extension agents are not upto date in the modern technical knowledge, the effectiveness of extension services in the rural areas is not as expected. The achievement of competitive advantage of an individual or any farming entity irrespective of its size or type depends on the management, marketing, training and infrastructure capacity (Ortmann and King, 2007, Nell and Napier, 2006). These skills categories are needed to emerging farmers, and should ideally be imparted to them by extension services. The extension workers should themselves be versed with these qualities for imparting them to the clients.

4. **Inadequate infrastructure and capacity for use of ICTs among the ground level extension workers:** The knowledge intensive agricultural systems in developing countries led to the considerable increase in the value of information. Access and use of current information is significant for not only financial success of farmers, but to support sustainable agricultural systems. By understanding farmers' access to and use of agricultural information, their agricultural information needs, and the factors that influence this behavior, programs disseminating agricultural information could better target farmers. (Babu *et al*., 2011) ICT has become a needy trend in the sector of information communication in the agricultural extension. The capacity of the field level extension workers is still questionable. A significant positive relationship exists between utilization of ICT facilities and age, personal income and availability of ICT infrastructure. Availability, access and utilization of ICT facilities poses as constraints in the mainstream of the agricultural extension system. The government should intervene in the deployment of ICT infrastructure in the rural area. There is likelihood of stagnation in the dissemination, utilization and application of scientific agricultural information for purposeful development if ICT infrastructure is not part of national policy. It should be integrated into the regulatory reform and the agricultural policy. Access to communication technology implies not only the physical availability of communication equipment and methods, but also the existence of the right condition for use in getting information. The government should take steps to build basic infrastructure in the rural area namely, electricity, internet connectivity, telephone cabling and or laying of fibre optic. This will facilitate

collaborative research through the use of local area network in a bid to coordinate agricultural data and information management systems.

5. **Lack of monitoring and assessment of impact of extension activities in rural farmers**: An assessment of the progress of the ongoing activities and evaluation of the accomplished one is lacking in the governmental extension system. There is the need of evaluation to determine project or policy effectiveness on various facets like Program Effectiveness: (measuring the effectiveness of an intervention in meeting objectives), resource effectiveness (analyzing the benefits and costs of an intervention, including cost per beneficiary), service to diverse audiences (measuring the effectiveness of the types of interventions in respect to the target group e.g., women, ultra-poor, ethnic minorities, etc) and the experiential effectiveness focusing on how users of extension services perceive service quality, or their intention to use new information and/or technology. (Suvedi-2016-Extension-Evaluation-MEAS-Discussion-Paper)

6. **Low level of need based extension coverage particularly for small farmers :** Extension systems, may be public or private, have played a vital role in adapting to ever-changing production, socioeconomic, and environmental conditions of the smallholder farmers. Governments have traditionally provided majority of extension services to smallholder farmers in developing countries. Public support to fund extension programs has diminished over the past decades. (Gómez *et al.*, 2016) Meanwhile, rapid changes in global food markets in recent years have prompted private companies (for-profit and non-for-profit) to take a more active role in the provision of extension services. In some instances, traders and retailers have expanded their supply chain responsibilities, investing and engaging with smallholder farmers around a number of quality and productivity goals, and responding to pressure from non-governmental organizations (NGOs), consumers, regulatory agencies and governments to expand supply chain transparency from farm to final consumer product. There is the need of client based, commercial and privatization of extension services for overall development of smallholder farmers. (Gómez *et al.*, 2016)

7. **Ineffective and weak linkages between stakeholders at different levels:** The extension system in the developing countries are facing an extreme problem of lack of a close working relationship between national agricultural research and extension organizations, and with different categories of farmers and farm organizations. The scarcity of the government sources in research and extension and fight over the limited sources is the crucial reason of the poor linkage. Thus the leaders of these systems are not seeing themselves as the part of the broad agricultural technology system. Farmers and the farming institutes are also not being appreciated for their roles in agricultural development taking part in both information dissemination as well as effective feedback mechanism. (Swanson *et al.*, 1997)

8. **Low level of education of farmers:** Small farmers are generally economically weak, low social and educational status. Studies have shown that the efficiency of agricultural extension activities depends substantially on the attributes of farmers receiving the information (Atsan *et al.*, 2009). The farmers do not have access to many extension services and are unable to get into the message from the use of modern information sources like internet, ICTs, smartphones, etc. the message in the extension process needs to be simplified by the use of traditional language and words. Many farmers in rural areas do not have the most up-to-date information on how to grow food efficiently and economically. The crop productivity can be increased rapidly by Improving their knowledge of new techniques and technologies along with providing them with any physical resources necessary for implementation (Rosegrant & Cline, 2003). Lockheed *et al.* (1979) also concluded that the effects of education were much more likely to be positive in modernizing agricultural environments rather than in traditional ones. Thus educating the farmers will lead to effective results of extension efforts.

9. **Insufficient budget and investment for extension activities:** The trend of the share of budget in the agricultural development is very low as compared to other nations of the world. The government expenditure has fallen from 30 percent in the eighties to below 5 percent to the current time. Though share of agricultural budget has reached to 3.11 % in 2010 from 2.45 % in 2005 but the AGDP has around one third in national GDP (SAAPE, 2011). The figure clarifies that the field of agriculture and in specific agricultural extension is extremely neglected. For overall national development, there is the need of huge investment in the field of agriculture development.

10. **Domination of supply driven approaches rather than demand driven**: The agricultural extension services should be well managed, effective and accountable which can address the demand or need of millions of farmers engaged in diverse and complex farming system in the country (Birner & Anderson, 2007). The concept of the demand driven extension to provide the farmers with extension services based on the need of the farmers. The extension services in Nepal are more based on the donor's interest and are less concerned on the demand of farmers. The practice of privatization of the extension is not seen in the country. A good demand driven extension service is possible when there is commercialization and privatization of the extension services (Birner & Anderson, 2007).

11. **Inadequate extension services in parts of value addition and market exposure:** The competition and open market in the agricultural sector led the concept of agriculture from the production to processing, post harvest technologies and value addition. The public extension services are focused still highly

focused on crop production. The increase in agricultural production is the major objective of any extension services. The time has come that the extension services are now needed to be diverted from the production to value addition and market exposure. In Nepal, the farmers are now seeking services in these areas. Farmer's problems now can only be addressed by incorporating the scope of value addition and market exposure in the public extension system.

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