Agriculture Extension Service and Knowledge Dissemination: Past Experiences, Present Status and Strategies for Effective Reach to Farmers in Changed Context

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Abstract

This paper attempts to review the agriculture extension service and knowledge dissemination system in Nepal, identify changing environment for extension, scan the present scenario of extension and knowledge dissemination, illustrate government policy, gauge problems and dig out issues and recommend for improved extension and knowledge dissemination for Nepalese farmers in changed context. Public extension system has been found dominant over the past 6 decades. The frequently changing public extension organization lacks stability in the extension modality and is posed with problems and issues for its capacity to provide service and knowledge in the changed context. The shifting emphasis towards commercialization, diversification, sustainable and inclusive development and changing business environment for agriculture at nation and global level demands review of existing extension system. The government policy for extension has not just to identify the pluralistic approach but should implement well by recognizing and utilizing the expertise of different service providers in the country. Majority of farmers charge public as well as private organization for not being effective and efficient and even in catering their need for solving their problems. This demands dynamism in the existing extension organization. Supply driven, inadequate physical facilities, wider command area, inadequate communication with farmers, poor motivation on the part of extension personnel, lack of clear cut job responsibility, technical competency and inadequate monitoring as well as evaluation have been identified as major problems in extension whereas extension service in diversities, capacity enhancement of extension staff, duplication of command area among service providers, low service coverage, devolution of extension service , emerging global concerns in extension, subsidy matter as well as implementation of NAES are major issues concerned. Similarly, timely dissemination, quality of expertise service, mobilization and utilization of concerned media, forum and approach has been reported as issues in knowledge dissemination. For greater effectiveness, institutional reform, clarification of strategic objective, empowerment of farmers, enhanced linkage among stakeholders and use of participatory and user friendly approaches along with enhanced IT is recommended.

1. Background

Nepal is predominantly an agrarian country with physiological and ethnic diversity. About 86% of the people live in rural areas. Agriculture employs 62 percent of economically active labor force, and about 65.6 percent of the total population depends on it for livelihood (MoAC, 2010). The contribution of agriculture to GDP is about 32.6 % and horticulture sector alone contribute about 21% to the AGDP (MoAC, 2010; Kattel,2008).The unique physiological,

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climatic and biological diversity favors to grow almost all plant and animal species of economic importance. The average holdings of farmers is 0.78 ha having subsistent farm production (CBS, 2002).

The agriculture in Nepal is further characterized by low production and productivity, limited commercialization of agriculture sector, dominance of small farmers, poor competitiveness with domestic and international markets due to technical, financial and social access on agriculture service delivery and technology utilization. Amidst this scenario, the country is struggling for the development of efficient agricultural extension systems to accelerate the agriculture development through agricultural commercialization, diversification and sustainable use of natural resources thereby alleviating poverty in country (MoAC, 2004; MoAC, 2007). Horticulture is one of the major sectors within agriculture in Nepal with comparative advantage over other crops. (APPROSC, 1995; Shrestha, 1998).

Van Den Ban and Hawkins (1998) define extension in general as the conscious use of communication of information to help people form sound opinions and make good decisions. Systematically, it has been viewed as a process of helping farmers to analyze present and expected future situation, to become aware of their problems, increase knowledge and develop insights into problems, help them acquire knowledge, make better choice, increase motivation and to evaluate and improve their own opinion forming and decision making skills. Hence, extension function is not limited just at mere transfer of technology but is accountable to justify its dissemination and improved decision making of farmers (Van Den Ban and Hawkins, 1998).

According to Rogers (1983), knowledge dissemination is the fairly simple process of communicating new findings and outcomes to the field. It has been found one of the barriers for farmers to achieve goal by extension organization. Knowledge dissemination synonymously known as communication of information comprise of flow of message from source to the intended target audiences. Knowledge dissemination/communication is an integral part of knowledge diffusion process. Diffusion refers to process by which innovations are spread to members of social system and influence the decision regarding an idea and innovation.

Knowledge utilization is a more complex process of applying the knowledge that is disseminated. This process helps in bringing desirable changes in the targeted audiences through practical application of knowledge. The effectiveness of the extension organization depends on the utilization of the knowledge that lead to production of intended output by the clients.

2. Review of Agricultural Extension Service Delivery

2.1 Global Agriculture Extension and Shift in Paradigm

The review of global public extension service clearly indicates the departure from solely public funding extension service to different models as the extension approaches controlled and operated by single public sector could not be sustainable. Some of the transition in agriculture extension service delivery can be illustrated as (Qamar, 2005; Thapa, 2005, Swanson, 2008):

- Transition from public technology transfer to private one.
- Decentralization with different institutional arrangement (de-concentration, delegation, devolution) in different countries and transfer of special authority to NGO/CBO/private institutions (as in Chile, Uganda, etc)
- Shifting towards demand driven or farmer-led extension. Market driven approach
- Alternate approaches to reduce cost such as contract out and outsourcing.

2.2. Review of Public Agriculture Extension in Nepal

Nepalese Agriculture Extension Organization: Faces Frequent Changes

An institutionalized agricultural extension service in Nepal began with Indian and American support in 1951 and planned efforts for agricultural development started in 1952 with the establishment of Tribhuvan Village Development Department (TVDD) under the point four program of the USAID. Since then, agriculture extension organization has passed through frequent organizational changes. The major departure in the extension organization in Nepal can be traced out as (DAT, 2002; Thapa 2005; Sharma & Khanal, 2009a):

- Domination of public extension organization till 1990.
- Emergence of several nongovernmental organization and community based organization (NGO/CBO) with liberalization policy after 1990.
- Shifting towards farmers-led extension such as farmers' group approach (FGA), farmers' field school (FFS) approach, leader farmers in sustainable soil management project, farmers group coordination committee as in Crop Diversification Project and agriculture development committee (ADC) as in Agriculture Training and Extension Improvement Project.
- Devolution of public extension service as spirit of Local Self Governance Act (LSGA) 1998.
- Shift towards contract out and outsourcing (through Agriculture Research and Extension Project as well as Crop Diversification Project and other projects).
- Shift towards pluralistic extension service such as partnership approach. In this line, public private partnership, public-public partnership, GO-NGO partnerships have been observed in extension service.

Extension Service and Knowledge Dissemination System in the Past

Unlike extension organization, the service delivery and technology dissemination regardless of commodities has also been found to go frequent change with changing organizational structure in Nepal.

- Training of farmers as in Training and Visit (T & V) approach.
- Farmers' capacity enhancement through demonstration of technology with their participation.
- Different mechanisms to ensure research and extension interface through which technical problem and issues are raised and solutions are developed through joint workshops and meetings such as technical working group meeting at different levels.

- Commodity specific trainings to enhance the skills of the farmers at service centre, district, and regional as well as central level. This is still in practice.
- A separate institution for agriculture information and communication was effective.

Presently, Agriculture Information and Communication Centre (AICC) has been functioning with the mandate of providing technical information and communication for farmers, agriculture technicians, livestock and concerned stakeholders through radio, television (TV) and publication of the relevant technology.

2.3 Review of Horticulture Development in Nepal

The major events in development of horticulture can be traced out as:

- The initiation of horticulture development in 1937 with establishment of horticulture farm (Godawari and Balaju).
- The pace of accelerated horticulture development through establishment of 24 horticultural farms in 1960s and 70s.
- Establishment and existence of separate department of horticulture during 1967-1972 and in 1990.
- Emphasis on horticulture development through projects like horticulture development projects, vegetable seed development project, etc.
- Development of horticulture master plan.
- Continuation of technical directorate (vegetable and fruit) and national program (potato and citrus) under DoA and horticulture research division under NARC.
- Implementation of donor assisted projects (ADB/M funded horticulture development project, JICA funded HDP, FAO assisted vegetable/seed project, Swiss assistance in potato.
- Policy declaration for coffee and tea along with establishment of separate board for promotion of these commodities.

3. Changing Environment for Extension

Presently, business environment for agricultural extension is changing fast. The pressure for change has been brought particularly due to increasing globalization of farm sector, need for commercialization and diversification of agriculture, consumers demand for service and quality product and also because of increased competition for service providing institution as well as privatization of public extension service. This calls for change in the attitude of public sector organizations as well as other stakeholders to reorient their capacity of delivering services. Broader extension agendas are emerging. Shift in paradigm of extension is taking place to cater the emerging needs of the farmer for diversified technologies, marketing and agribusiness, natural resource management, farm mechanization, etc (Qamar,2005). Importantly, extension service providers are diversifying.

In this regard, the emergence and existence of outside government organizations, particularly I/NGOs, CBOs, PSOs etc have made more competitive and cost effective. Role of public sector extension is changing (Acharya, 2002). Public sector has to play the role as "service provisioner" rather than as "service provider". This calls for the need to reorient vision for

extension, which should be based on the considerations of farmers, input suppliers, private and civil society extension service providers, local governmental bodies, central and regional governmental institutions, and the diversifying extension agents. The government has already introduced policy reform to promote public-private partnership, partnership with beneficiary groups and community organizations (MoAC, 2007). Policy of contracting out extension programs has also been introduced. Implementation of extension programs in line with LSGA has been initiated (LSGA, 1998).

Other environment that needs to be considered is increased competency to combat problems and gain advantages of Nepal's accession to WTO. Moreover, transformation of country to federal structure would demand radical changes in the existing organizations and their working modalities in the service delivery mechanism and technology transformation to the concerned client. The new good governance act and policies focus for the increased access of diversified clients, social inclusion, transparency and efficiency and effectiveness (GoN, 2008).

4. Present Organizations and Modalities for Extension and Technology Dissemination

4.1 Organization for Extension and Technology Dissemination

This section will focus on the public extension organization. DoA is solely responsible for transfer and dissemination of technology within country. District Agriculture Development Offices (DADOs) are the service providing organization at district level .DADO comprises of teams of SMSs with agriculture extension, horticulture, agronomy, plant protection, fishery and agriculture economics. DADOs provide service through agriculture service centers (ASC). These ASCs are the grass root institutions to provide the agriculture extension service at farmers' level.

Previously, Junior Technicians (JT) and Junior Technical Assistants (JTA) were supposed to provide mobile extension services in the command areas. Presently, these extension workers provide services to farmers through farmers groups. The number of ASC is assigned at the ratio of 4:6:4 for mountain, hills and terai districts respectively after organizational restructuring of MoAC in 2005 (DoA, 2009) Presently, the provision of contact centre (CC) has been made and flexibility has been provided to effectively utilize the existing physical resources such as ASC buildings based on demand of VDCs. The number of CC is not fixed and is being assigned as per need by DADO. It mostly depends upon the availability of field staff and office building to station on local condition. Earlier, ASCs were established and operative in almost all ilakas of the district. The government policy was to establish all developmental and administrative service centers in each ilaka. Now the infrastructures already developed in each ilaka exceeding the number of ASCs are being used as CC.

Another effort to improve the extension support through these institutions is model agriculture service centre (MASC). The concept of MASC was implemented to increase the efficiency and implement the service delivery with improved effectiveness of existing ASCs so that it could be internalized countrywide. Priorities have been given to improve the physical condition and

equip them with essential facilities. Such model service centers have been established one in each development region (DoA, 2009).

Recently, the concepts of community agriculture and livestock service centre (CALSC) and integrated service centre (ISC) have been proposed to enhance the access of farmers to agriculture extension as well as basic service facilities.

The concept of CALSC is being put forward by MoAC with the objective of making service delivery more inclusive, ensure access of users' group and help commercialization of agriculture through best utilization of local resources and skills of local individuals. The proposed model emphasize the participation of farmers groups and cooperatives in the planning, implementation, monitoring and evaluation as well as management of program at community level to make service more responsive and client oriented. The contributions of local government bodies (VDC/DDC/Municipalities) and concerned NGOs/CBOs/private sectors are also expected. Farmers improved access is expected through the representation of each groups and cooperatives in the service delivery through CALSC. This concept of CALSC has been practiced by farmers in Surkhet and Sunsari districts. A guideline for establishment of CALSC is being drafted through DoA based on the recommendation of national workshop on CALSC guideline preparation workshop (Adhikary and Chapagain, 2008; DoAE, 2009, DoAE/GTZ PASRA Nepal, 2009).

The concept of ISC has been put forward by GoN with objective of providing basic services (administrative, health, agriculture, veterinary, postal, revenue collection, and the like) under one umbrella institution at *ilaka level* (the political and administrative unit of district). The basic objective of these institutions is to expand the service opportunities of district level offices at *ilaka level* for improved access of people and enhance effectiveness in service delivery.

4.2 Modality for extension and knowledge dissemination

The following are major modalities currently being practiced for extension and knowledge dissemination in agriculture development (DoA, 2009).

- Farmers' group approach
- Farmers field school approach
- Use of mass media including modern information technology (IT)
- Use of trainings
- Partnership approach
- Use of demonstration and extension materials
- Research-Extension-Farmer interface
- Other farmers to farmers' extension approach such as agriculture development committee, farmers' groups' coordination committee and farmers cooperatives.

5. The Changing Policy

GoN has declared policy of entrusting most development programs to local bodies in line with LSGA by devolution through responsibility and accountability shifting. In this line, the agriculture extension service has already been devolved to local government bodies. Partnership with non-governmental organizations (NGOs), private sector institutions and farmer organizations is being encouraged for efficient delivery of agricultural services. Public-private partnerships (PPP) are being encouraged to augment the process of technology development and transfer as well as agricultural marketing. Legal institutions facilitating such endeavors is being reviewed and acted upon. The national development plans have recognized agriculture-led growth strategy as the major strategic option for overall economic development of country. The major endeavor in this line encompasses (Sharma & Khanal, 2009a).

- Modernization of extension services through participatory bottom up planning,
- Projectization of extension services,
- Partnership and contracting out of extension services,
- Adopting alternative institutional arrangements to promote polycentricism and redefining government's major role as enabling environment rather than service provider,
- Devolution of agricultural extension services to local government
- Policy declaration for various sub sectors of agriculture.

6. The Changed Context: Need for Dynamism in Extension Strategy

An efficient extension organization needs to develop the capability of responding to changes in relation to its environment. Extension organizations have to cope with changes within and outside the organization, such as changes in farm technology, communication methods, needs of farmers, rural situations, export and import of farm produce and market economy. Organizational development allows for planned changes in the organization's tasks, techniques, structure and people. Attitudes, values and practices of the organization are changed so that they can cope with changing situations. The employees also gain greater skills to deal with new problems.

Besides government extension organizations, there are NGOs, CBOs, and private service providing organizations playing very significant role in Nepalese society. Each of these organizations has their own merits and demerits (Acharya, 2002). Furthermore, Nepalese farmers being heterogeneous (subsistent to commercial in nature, small to larger in size with dominance of small farmers, diversity in ethnicity, social and economic diversity,, accessible to remote in geographical terrain, and the like), the pluralistic approach recognizing the expertise and experience of diverse organizations (public/private/CBO/NGO) would be better to cater the need of diverse categories of farmers (Sharma & Khanal, 2009a).

The major approach of service delivery as well as technology dissemination adopted in Nepal encompasses the farmer's group approach (FGA). FGA was officially recognized as strategic approach since 1988/89. Presently, there are around 17074 farmers groups under DoA and 13265 farmers groups under DoLS (DoAE, 2009). These groups are expected to serve as effective vehicle in the transfer of technology. However, all groups are not successful.

Especially, these groups have been successful in raising awareness, collecting and utilizing fund, technology transfer and ultimately empowering farmers. Similarly, farmers' cooperatives (FCs) are equally utilized in the delivery of agriculture extension service. The development of farmers and FGS into FCs enables farmers for improved farming, commercialization and creates the environment of self-help. It also ensures the legal status of the farmer's institution (Sharma & Khanal, 2009b). So, there is need to reorient extension organization that better address the need of the farmers and capitalize the expertise and efficiency of farmers groups and cooperatives for agriculture development including horticulture development.

7. Problems and Issues in Extension Service Delivery and Knowledge Dissemination

Public sector still dominates the service delivery and knowledge for agriculture extension in Nepal. In the recent year, the service delivery modality has been shifted from sole public to pluralistic approach where both public and private sectors are involved in providing extension services. Such mechanism encompasses public private partnership, contracting out, outsourcing, farmers to farmers' extension and the like. In addition, there has been transformation of service delivery institution and support system within the government organization as well. The government institutions have accountability to offer services and provide knowledge for vast majorities of farmers to date (Sharma and Khanal, 2009a).

Agriculture extension has been criticized by farmers, political leaders as well as institution like parliament for not serving the farmers and not being effective. A survey conducted on service delivery survey, health and agriculture Services, 1997 on 18500 households covering 108000 people reported that only 3% of households had ever been visited by a government agricultural extension worker and 2% by a non-government extension worker (Nepal NMIS Survey, 1997). At present, an average of 10-12% (DoA's projection) of farmers have direct access to public extension service whereas this figure has been reported to be only 5.4% for purchase of improved seeds by clients (Pro-public, 2005). The common grievances regarding service delivery are the type of service offered, quality of service, timeliness, access of marginalized communities as well as the presence and competency of extension personnel (Nepal, 2006).

Similarly, learning system within NARC and other stakeholders is reported weak indicating need for strengthened collaboration among stakeholder for enhanced and deliberative interface between scientists and farmers (IDRC, 2008).

7.1 Problems Encountered in Extension Service Delivery and Knowledge Dissemination

Despite 6 decades efforts of public extension and two decades of liberalization experiences, there are prominent problems and issues in the service delivery mechanisms and knowledge dissemination at public sectors.

Domination of Supply Driven Approach

Though the practice of bottom-up planning has been internalized in the public extension system, still there is dominance of supply driven programs and extension activities. The extension services are made available to clients based on availability of programs and budget

from government sides. Knowledge for technology dissemination is designed by extension personnel and farmers' specialties for need of knowledge are rarely addressed.

Inadequate Physical Facilities at Service Centre

The ASC are poorly equipped with minimum requirement of physical instruments and extension teaching materials. Even there is lack of buildings for the office. Moreover, the conflict which prevailed for one decade resulted in the destruction of important service infrastructures and they have been rarely repaired and maintained. However, priority has been given to maintain the physical condition. The poor physical condition of the service centre has largely influenced in the extension service delivery and knowledge dissemination.

Wide Command Area of the Service Centre

The command area of the ASC is very wide with average coverage of more than 9 VDCs to as high as 20 VDCs. The delivery of service has been difficult by the limited manpower to the wider ranges. The ratio of extension worker to farmers is more than 1:2000. This has severely affected the extension and knowledge dissemination efficiency of the existing staff (Sharma and Khanal, 2009a).

Inadequate Communication between Extension Staff and Farmers

Another major problem regarding service delivery is that there is limited communication between extension staff and farmers. The communication has been made more complex due to geographical location and poor access of the farmers at remote areas.

Poor Organization and Packaging of Research Findings

Another problem related to the effective transfer of research findings is that most dissemination practices are not organized or planned to achieve comprehensive impact. Four strategies exposure (increasing knowledge), experience (increasing positive attitude towards new knowledge), expertise (increasing competence) and embedding (increasing innovation use over time through organizational system) have been found to be effective in knowledge dissemination to the intended users which is lacking with us.

Poor Motivation of Field Staff

Another important problem regarding service delivery is the poor motivation for the field staff. They hardly receive allowances and incentives for their contribution in the field. Poor professional training opportunities, lack of time based promotion system are other motivation factors associated with poor motivation of the extension personnel. However, the current promotion of civil servants as per 'Civil Service Act' has been influential in the promotion of the extension staff to a greater extent.

Lack of Clear Cut Job Responsibility

The job responsibility and Terms of the References (ToR) for different extension personnel was designed around a decade ago. This has not been strictly followed and revised yet. Furthermore, the agriculture extension workers at the district office have to perform diversities of task, which is beyond the discipline of their profession such as engineering works in small irrigation program. This has resulted in the dilution of their professionalism.

Technical Qualification of the Extension Personnel

Most of the field extension staffs have academic background of vocational agriculture equivalent to grade 10, JT/JTA training from Council of Technical Education and Vocational Training (CTEVT), I.Sc. Ag. & so on. Their educational qualification is not enough to cater the need of farmers at present context. Farmers demand the specific and specialized skill which can not be satisfied by extension staff. The extension workers are however, able to deal the general and common problem of the farmers. Horticulture sector is diversified field in itself. There specialized technical staffs in this field are very rare.

Low Service Coverage

Though priority has been given for greater social inclusion and increased access for remote areas, still the farmers from accessible areas are benefiting more from the public extension delivery system. Low accesses to service, poor communication, and inadequate linkage, high transportation costs to ASC and district headquarters are some factors for limiting the access of the farmers for better service.

Inadequate Monitoring and Evaluation

Adequate monitoring and evaluation has been limited due to inadequate funds, limited manpower and remoteness of area. There is lack of objective monitoring and evaluation system. Likewise, the feedbacks and recommendations of the monitoring and evaluations are not strictly implemented.

7.2 Issues in Agriculture Extension Service Delivery and Knowledge Dissemination

There have been key issues regarding the agriculture service delivery at the field level. These issues encompass:

Extension Services in Diversities

The specific features of ecological climatic and the socioeconomic diversities of the country have challenged the agriculture service delivery and technology and knowledge dissemination in Nepal. The clients with diverse characteristics cannot be met from the similar package. These diversities demand specific technology, service, and incentive package such as subsidy in service and inputs, special technical knowledge, supply of easily comprehensive materials

and so on. The climatic diversities do not always challenge the agriculture extension but provide the opportunities to capitalize the diversities as well.

Capacity Enhancement of the Extension Workers

Major issues regarding the capacity enhancement of agriculture extension staffs are that they are not well trained; lack specialization and their capacity are not updated as per need of the clients. However, subject matter specialists are located at district headquarters; their services are not available as and when required to the farmers at village.

Duplication of Command Areas

After the economic liberalization of 1990s, a number of NGOs, private and CBOs emerged as alternative service provider in agriculture. These institutions also supplemented the service delivery and technology dissemination function of the government. Despite their contribution, duplication of areas and clients has been reported for the similar extension service provision.

Rationality of Program Budget Allocation

The allocation of the budget is more or less in similar amount across the districts regardless of the number of VDCs, the potential agriculture land, potentiality of agriculture diversification and the population to be served. Furthermore, cost of input and technology at hill and mountain districts are higher due to transportation cost in comparison to districts with road access. Recently, the concept of indexing for allocation of budget has been raised for judicious and rational allocation of budget for different districts based on key parameters. However, this approach has not been practiced yet.

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Devolution of Agriculture Extension Service

Agriculture extension service in Nepal has been devolved to local government, District Development Committee (DDC) as follow up administrative action to LSGA to make agriculture extension more responsive to local need, allocate local development fund and improve access of service with active involvement of clients. However, this resulted in mere shift of practice of planning and government fund to DDC. It has thrown challenges for local leadership, policy makers and field units to show professionalism in working with local people representative. Moreover, issues of extension function clarity, chain of command, human resource development, fund contribution to agriculture extension, and technical backstopping

have been raised. Local bodies could not take ownership and practice was employed before capacity enhancement of DDC to internalize the essence of devolution (Pro-public, 2005).

Global Issues in Agriculture Extension Service Delivery

Agricultural extension organizations have also been widely influenced by contemporary global issues. These issues encompasses globalization and market liberalization, privatization, pluralism, world trade organization, HIV AIDS and its impact on agriculture and food security, social inclusion, sustainability and environmental protection, natural and man made disasters, partnership for greater effectiveness, gender balance, development and utilization of IT tools in agriculture extension and so on (Qamar,2005; Swanson,2008).

Issue of Subsidy:

There has been growing concern of the donors in the past to curtail subsidies in agriculture. Nepal, for instance, gradually cut off fertilizer subsidies to an end. This has greatly influenced the agriculture extension. Nepal's accession to WTO has raised the concern for subsidy and Nepal recently decided to provide subsidy on fertilizer, which was removed after deregulation of fertilizer. The issue of subsidy is important for overall agriculture development and especially the development of horticulture sector as well. Recently, GoN has identified special commodities for export promotion. Nepal should exercise well in terms of modes of subsidy for the increased competitiveness of Nepalese commodity in international market.

Implementation of NAES

A comprehensive National Agriculture Extension Strategy (NAES) was prepared with the objective of making agriculture extension services efficient and effective as envisaged in Agriculture Perspective Plan by making it more practical, poor oriented and participatory in consistent with changed context along the spirit of 10th Five Year Plan/ Poverty Reduction Strategy Paper. The strategies focussed on implementing NAES implementation by preparing guidelines, conducting nationwide campaign and orientation training and strengthen monitoring system (MoAC, 2007). But this implementation strategy has not been materialized yet.

8. Recommendations for Enhanced Extension and Knowledge Dissemination in Changing Contexts

Despite criticisms regarding service delivery, there is scope for improvements in the extension service delivery and knowledge dissemination. Horticulture sector can be developed as the strong sub-sector that can contribute to food security in Nepal. Following recommendations are proposed to improve service delivery of agriculture extension in future.

8.1 Enhancing Extension

i. Assess the existing extension organization against farmers' needs, specialty need for commodities and determine ways for strengthening as well as restructuring.
    i. The job responsibility and Terms of References (ToR) for different extension personnel should be redesigned with their shifting roles in the present context.

The extension staff should not be engaged in activities other than their profession (such as mandate of small irrigation program).

ii. Monitoring and evaluation should be made objective. The monitoring should be done at micro level based on team approach.

iii. The physical condition of the ASC should be improved and they should be equipped with minimum equipments supplemented by appropriate teaching materials. The concept of minimum requirement in an organization for greater service effectiveness should be executed.

ii. Encourage the extension services to empower farmers through organizing them into legal associations to constitute a strong lobby for themselves and for extension.

iii. The motivation package, inclusive of capacity enhancement opportunity as well as monetary and non-monetary incentives must be ensured for the field level staff. At the same time, technical capability of the extension should be improved.

iv. The tools including norms used for extension demonstration should be redesigned in changed context.

v. Knowledge bases of extension should be expanded regarding the new emerging issues and their impact in agriculture development. The issues of globalization and market liberalization, privatization, WTO, HIV AIDS and food security issues, social inclusion, sustainability and environmental protection including climate change, partnership, gender balance, utilization of IT and so on.

vi. The role of government farm should be enhanced through physical infrastructure improvement, redesigning function of farms and making them as centre of excellence for technology development and utilization.

8.2 Knowledge Dissemination

i. Ensure effective operational linkages between extension and research and other key relevant institutions. The research-extension-education institution and farmers/entrepreneur's linkage mechanism should be redesigned and role for each stakeholder need to be clarified.

ii. Appropriate alternative and effective approach and method should be identified such as plant clinic, farmers' field school, farmers' fora, rural information centre for enhanced dissemination of agriculture knowledge.

iii. Develop local resource centre as the centre of excellence for dissemination of knowledge to the farmers. Similarly, the local para-professionals including resource centers should be utilized in the extension and knowledge dissemination function.

iv. The strategy of extension and knowledge transfer should be based on objective of the program. The present public organization at grass root level are influential in meeting general external service and creating awareness and solving general problems of farmers. However, for solving specific problems, specific technical group or expertise from private sector need to be emphasized.

v. The role of information technology should be well focused. The effectiveness and utilization of present media should be assessed and redesigned considering the general and specific knowledge requirement of the farmers. In this regard, use of mobile phone, email, internet and other IT equipment should be enhanced in information flow and knowledge dissemination.

vi. Local media especially frequency modulation radio have been found effective in delivering knowledge for particular locality in their own local language.
vii. The training modality and design should be developed based on field orientation.
viii. Original, location-specific, participatory, gender-sensitive and inexpensive extension methodologies and materials should be developed instead of applying same methodology for all.
ix. The role of IAAS/HICAST and similar institution should be enhanced and dissemination of research finding should be institutionalized through appropriate mechanism. The agriculture technology and coordination section headed by Deputy Director General of DoA should be made responsible in this regard.

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