Virtual Resources Center
in Social Work

Social Research Reports

Volume 20

June 2011

Expert Projects, 2011

SOCIAL RESEARCH REPORTS
ISSN: 2066-6861 (print), ISSN: 2067-5941 (electronic)

Partnership between and among the state and non-state actors in agricultural extension

Gana Pati OJHA

Social Research Reports, 2011, vol. 20, pp. 3-116
The online version of this article can be found at:
www.reasearchreports.ro

Published by:
Expert Projects Publishing House

On behalf of:
Virtual Resources Center in Social Work
www.asistentasociala.ro

Additional services and information about Social Research Reports can be found at:
www.researchreports.ro

*Email***:** dananacu@gmail.com**;** url: www.researchreports.ro
Social Research Reports (ISSN: 2066-6861 print / ISSN: 2067-5941 online is the official journal of Virtual Resources Center in Social Work.

Social Research Reports is subject to a peer review process and its published by Expert Projects, Iasi, Str. Voinesti, Nr. 63, 700615 Romania, Tel: 0040.332402515, Fax: 0040.332402516.

Subscription rates:
Institutional rate (print): 120 Euro; Personal rate (print): 60 Euro; Personal rate (online): free.

Subscription enquiries:
Expert Projects, Iasi, Str. Voinesti, Nr. 63, 700615 Romania, Tel: 0040.332402515, Fax: 0040.332402516, email: stefan.cojocaru@expertprojects.ro.

Adverstising enquiries:
Expert Projects, Iasi, Str. Voinesti, Nr. 63, 700615 Romania, Tel: 0040.332402515, Fax: 0040.332402516, email: antonio1907@gmail.com; contact person: Antonio Sandu.

SOCIAL RESEARCH REPORTS
Vol. 20, June 2011

PARTNERSHIP BETWEEN AND AMONG THE STATE AND NON-STATE ACTORS IN AGRICULTURAL EXTENSION

Gana Pati OJHA[1]

Abstract

This study described the extension process of seven patterns of extension service provision and identified their effectiveness. The specific objectives were 1) to describe the dynamics of extension service provision of three individual extension patterns (IEP) and four interagency partnership extension patterns (IPEP) of government organizations (GOs), nongovernment organizations (NGOs) and private organizations (POs) to farmers in East Chitwan, Nepal in terms of implementing the extension activities; 2) to identify the effective institutional patterns in extending agricultural technologies to farmers in the study areas; and 3) to identify, describe, and explain the factors contributing to the effectiveness of patterns in the provision of extension services in the study areas. This study was conducted for 21 months and used both qualitative and quantitative research methods. Rapid rural appraisals (RRAs) and participatory rural appraisals (PRAs) were used in the beginning of the research to determine the farmer-identified research problems, research sites, technologies, and partner agencies. There was a complete enumeration of 123 farmers who adopted the recommended varieties of hybrid maize or farmer-preferred rice or sunflower and 17 agency personnel who were directly involved in extending the related technologies at the study sites. The researcher collected information through observation, interview schedule, checklist, tape recorder, photography and diary. Descriptive statistics such as proportion, percentage difference, and mean were used to describe the process and effectiveness of the patterns. The Pearson's correlation coefficient was used to determine the relationship between institutional factors and effectiveness. The study showed that GOs and NGOs extended recommended technologies through farmers' groups, whereas POs did so through individual farmers. When these agencies forged a partnership, they worked through their assigned responsibilities and attained a higher level of performance than IEP in terms of target achievement. With respect to effectiveness, IPEP was more effective than IEP. Among the IPEPs, GO+PO and GO+NGO were more effective than the others. The GO+PO

[1] Vice-Chairperson, Community of Evaluators Nepal' 15/17 Tashindole Marga, Kalanki, Kathmandu-14, Kathmandu, Nepal; Phone: +977-1-4289827; email: gpojha@gmail.com

was effective in extending high-cost imported technologies to large farmers, whereas the GO+NGO was effective in extending low-cost, locally available technologies to small farmers. This study identified the factors related to effectiveness. Such factors included institutional resources such as the agent's time committed to the project and availability of extension materials; extension activities which included motivation of farmers, field visits, input availability, farmer training, record keeping, joint meetings of change agents, and farm demonstration; and proximity which included the agent's residence and the partner's office location. The agencies' fulfillment of their assigned responsibilities and farmers' adoption were strongly related. The partners forged a partnership not only for the benefit of farmers but also for their own. When partners realized that they were not benefiting, they broke the partnership.

Keywords: partnership; non-partnership; effectiveness; agriculture; extension; institution; pattern.

Introduction

Rationale

Access to improved agricultural technology is the key factor to increase agricultural productivity, promote food security, and eradicate poverty (IFAD, 1995, Mittal and Sethi, 2009). Accordingly, many governments and other development agencies make technology accessible to farmers through an organized system generally termed as extension service. Agricultural extension services in the past yielded varied results. On one hand, agricultural extension, along with other subsystems of agricultural development,[2] is credited for bringing remarkable changes in agricultural production in many countries. Many countries have changed their status from food importer to food exporter. Globally, the average daily per capita dietary energy available from food has risen from 2,440 in 1969/71 to 2,720 calories in 1990/92 (Alexandratos, 1996) and 2700 in 2010 (FAO, 2010). This remarkable achievement, however, has been nullified with the inability of the agricultural system, and specially the extension subsystem, to bring desirable changes in the life of over a billion of poor and small farmers. Even today, the number of people below the nutritional threshold, who are surviving with a daily per capita energy below 1,720 is more than 1.02 billion (FAO, 2009). Today's challenge is to make nutritious food available to all, not only for their survival but also for good health, and to enable them to achieve a long active life. This is where development agencies are focusing their efforts. Extension as a dynamic change system also needs to redefine its role accordingly.

[2] Agriculture system includes several subsystems such as research, irrigation, supply, marketing, education, and extension (Rivera, 1985).

farmers' conditions and the improper methods used to transfer these technologies to them are very critical. Although some efforts are under way to generate more appropriate technologies suitable for small and poor farmers, these are not yet accessible to them. However, as the process of developing more appropriate and productive technology gains momentum, it can be expected that the technological problem will not be serious as far as small and poor farmers are concerned (Fliegel, 1993). What is more crucial is the way the technologies are transferred (Farrington et al, 1993). Inasmuch as the present extension systems in many countries have not been able to address the issues and concerns of small and poor farmers, a search for new extension models that are more effective, efficient, and responsive to different categories of farmers is essential. Today, the involvement of the private sector including nongovernmental organizations (NGOs) in extending farm technologies to farmers is gaining momentum. Since the mid-1980s, the role played by the private sector and NGOs in rural transformation has been widely recognized. They have proved to be better choices as among many funding agencies (Carroll, 1992).

Associated with this shift is the continuous failure of the public sector agricultural extension services to respond to the needs of millions of resource-poor farmers (Ashby et al, 1995; Howel, 1986; Rivera, 1996). The success of some NGO extension services to reach farmers who were not reached before by the public sector is another factor that encouraged many funding agencies to shift their attention from the state to the NGO extension (Farrington et al, 1993). There is now a growing realization that NGO extension services can be more effective, efficient, and responsive in addressing the needs of agricultural development within the broader context of rural development (Carroll, 1992).

Similarly, in a time of growing economic liberalization, the role of profit-making private companies and traders in extending agricultural technologies to farmers is equally important (IFAD, 1995). Some experts predict that private sector extension will play a dominant role in the coming century. The World Bank and the regional banks seem to agree on this point (Rivera, 1996). For others, NGOs can become the alternative to public sector extension (Carroll, 1992). Recently, a different view that calls for the collaboration of these systems on the basis of their strengths and weaknesses has been expressed (Ashby et al, 1995; Clark, 1993).

In spite of the prominent roles that the three sectors (public, private, and NGO) have in information dissemination, past programs and studies were heavily skewed toward understanding the dynamics of public sector services. In recent years, there has been some deviation in the past trend with a proliferation of NGO literature, but the private sector organizations (POs) remain underrepresented. Studies made on public and NGO sector extension indicate that NGOs are more effective and responsive than public extension (GO) at the micro level (Carroll, 1992). Another finding from past studies is that GO-NGO collaboration is the best way to disseminate information (Farrington et al, 1993; Khan, 1991; Musyoka, 1991; Sollows et al 1991; Shah, 1995).

These conclusions, however, are derived without considering the role of the private sector (PO) in disseminating the technology.

Since the role of PO is equally important and seems to be more aggressive in the coming century (FAO, nd; Rivera, 1996), its role in information dissemination cannot be simply ignored. Some preliminary studies call for a more efficient public-private sector collaboration that will be beneficial to both public and private sectors (Cullin, 1994; Navarro, 1992). Similarly, there are some indications that NGO relations with both public and private sectors would yield better results than relations with the state alone (Cullin, 1994).

Partnership has become a popular subject these days, not only among the academicians but also among donors and recipients as well as international and national organizations. The World Bank is strongly advocating partnership between government organizations and civil societies (World Bank, 1997). The Consultative Group on International Agricultural Research (CGIAR) is also emphasizing partnership with members of civil society including NGO and PO to rapidly foster sustainable agriculture among resource-poor farmers (CGIAR, 1997). Similarly, the international agricultural research centers (IARCs), including the International Rice Research Institute (IRRI) are deviating from the conventional pattern of generating and transferring agricultural technologies. They are now making efforts to find ways to establish and foster partnership with NGOs and other civil societies. Many national systems are also supporting the ideas of these international institutions.

However, there are still information gaps about whether these partnerships will be beneficial in developing and extending agricultural technologies. Particularly, empirical studies of partnership are rare and therefore there is a clear need for more systematic and in-depth empirical research on partnership experiences (DfID, 2009).

This study intends to fill up that information gap by analyzing the partnership-building process and measuring the benefits of partnership in the Chitwan District of Nepal. As agriculture is the heart of the Nepalese economy, partnership between GOs, NGOs, and POs in agriculture development will be the subject area of this study.

Statement of the Problem

The above preliminary review reveals that (1) GOs, NGOs, and POs are important sectors in extending agricultural technologies; they work independently most of the time but there are times when they work together; (2) their contributions are not properly documented. Individually, literature on GO contribution predominates NGO literature. The NGO literature is mostly exploratory and does not have adequate empirical evidence. Literature on PO contribution at the micro level is scarce; (3) studies regarding collaboration between these sectors are very few. The focus of available collaborative studies is on the GO+NGO partnership. Also available are some studies that focus on GO+PO partnership. Studies focusing on the three-sector partnership are not very common.

The above analysis indicates that in extending agricultural technology, there is an information gap regarding collaboration of the three sectors in general and GO+PO+NGO in particular. This suggests that a series of studies need to be conducted at a time and in different places to compare the different collaborative combinations of the three prominent information dissemination agents. These efforts should be evaluated before making decisions regarding allocation of resources in favor of any of the combinations. This study also answers the following research question: Can farmers' access to agricultural technologies be improved through the synergetic combination of the extension systems of the GO, the NGO, and the PO?

Objectives of the Study

The general objective of this study was to assess the effectiveness of the three institutional modalities of technology dissemination and their partnerships in Chitwan, Nepal. The specific objectives are

- To describe the dynamics of extension service provision of three individual extension patterns (IEP) and four interagency partnership extension patterns (IPEP) of GO, NGO, and PO to farmers in east Chitwan, Nepal. These partnership patterns are as follows: IEP: GO, NGO, and PO; IPEP: GO + NGO, GO + PO, NGO + PO, and GO + NGO + PO.
- To identify effective institutional patterns in extending agricultural technology to farmers in the study areas; and
- To identify, describe and explain the factors contributing to the effectiveness of these patterns in providing extension services in the study areas.

Significance of the study

At present, a number of agencies are involved in information dissemination. Each has developed individual capabilities and specialization to address different sets of constraints. Some have started working through partnership by capitalizing on their strengths. This process, however, is in its initial stage; and thus will require more information to push it forward. As there is scarcity of information, it has to be generated through a series of research undertakings. This study is a step toward this direction. The information generated by this will be useful to improve the partnership between organizations involved in information dissemination. The findings of the study will have substantial contribution to the building of knowledge in the field of extension science and will help serve the needs of farmers, extension agencies, and researchers. This will provide information about extension management, resource allocation, and linkage development. It will reduce unnecessary duplication of efforts and help increase technology utilization. It will be beneficial to those who are interested in designing a knowledge transfer system that is effective, efficient, and responsive. Although this study is intended to be conducted on sunflower, maize, and rice, its usefulness will not be limited to these crops alone. This will be valid equally

for other crop and noncrop activities as the focus of the study is on the process of technology dissemination and partnership.

Limitations of the Study

The study was conducted in Nepal where NGOs and POs are at a developing stage. Generalization of the results of this study will be limited to areas where NGOs and POs are at a similar stage of development. There are two kinds of NGOs present in Nepal. One engages specifically in agricultural development and the other covers agriculture and other development activities. This latter type of NGO was the one involved in this study for technology dissemination. However, the technical capability of this NGO was lower than the technical capability of GO under study. Hence, these findings may not be applicable to all NGOs, particularly those with major focus on agriculture, because this was not considered. Pay, promotion, and position could not be compared among the three agencies because the PO staffs were self-employed. The comparison of these variables was limited to GO and NGO. For this research, the researcher purposely facilitated forging partnerships among GOs, NGOs, and POs in collaboration with IRRI researchers for this research. The Hawthorne effect may have possibly affected the behavior of the participants during the study. In some research sites such as Bachhauli and Kathar, the number of adopter farmers was extremely low. This did not allow drawing a sample randomly as conceived in the proposal. Instead, complete enumeration was done. This limited the use of inferential statistical tools that were originally proposed for this study.

Review of literature

With the failure of the market-dominated economy during the pre-World War II era and the failure of the state-dominated development efforts thereafter, development thinkers turned toward civil organizations in the 1980s to bring about the expected changes in the rural areas. The shortcomings of a single sector development approach (De Janvry et al, 1995) allowed development thinkers to recommend a paradigm shift from a single-sector approach to one that espouses collaboration of all sectors – state, market, and the civil societies (Ashby et al, 1995). They expect that collaboration among these organizations would bring greater effect on society than if they work independently of each other.

As this research intends to analyze the effectiveness of various types of institutions in transferring agricultural technology to farmers, literature related to the role of state, market, and NGO; institutions, linkage, and utilization of technology is reviewed. Finally, the theoretical and the conceptual frameworks of this study are discussed.

The Role of State, Market and NGOs in Development

What is a State?

A state is a macro structure consisting of administrative, policy, and military organizations, which are coordinated by an executive (Skocpol, 1979 as cited by Arce et al, 1994). Its main function is to integrate social actors who are separated from one another by the market, opposed to each other by class relations, and atomized by rational individualism (Touraine, 1988: 36). It breaks down particularities and aims for what is universal like liberty, equality, and fraternity. Since it needs to break down particularisms, the state often times, has repressive mechanisms to enforce compliance among the social actors. It monopolizes rule-making within its territory (World Bank, 1997). Aside from the integrative role of the state, it also has to maintain internal peace and order and protect its members from external threat. This explains why it needs to have well-equipped manpower and infrastructure (Farrington et al, 1993). For the state to do these functions, it has to mobilize and extract resources. It does this through taxes (Skocpol as cited by Arce, 1994).

While the state has the police power, it has to ensure that people's democratic rights are not curtailed. It has to ensure also that all its members are provided with basic social services such as housing, education, health and nutrition, and other public goods. It also acts a buffer between market forces and the needs of its members (World Bank, 1991). Therefore, one of the roles of the state is to correct whatever distortions the market has created in society. In this way, the state intends to balance the situation between the people and the market. Equity is another concern of the state. The state protects vulnerable members from unacceptable distribution of income to guarantee resources for an acceptable living standard (World Bank, 1997).

After the Second World War, the state became heavily involved in "development" programs and projects (World Bank, 1997). Development then is considered an alternative way of getting cooperation from people. With this premise, the state penetrated the market sector role massively. This resulted in the state's involvement in production, marketing, and development planning (Farrington et al, 1993). While this is pleasant as the state becomes less of a constable and judge and repressive, it nevertheless becomes more of an economist (Touraine, 1984). However, despite its heavy involvement on these activities, it fares poorly. It cannot be denied that its involvement in economic activities brought about dramatic changes at the macro level, but those benefits did not accrue to sectors which needed the most assistance (World Bank, 1997). Instead, it has supported an elite group in society, thereby marginalizing further those who needed assistance (Turner, 1985).

Despite the failure of state-dominated development, the presence of state is yet necessary because stateless development has also failed. Therefore, an effective state role is always required (World Bank, 1997). For the effective functioning of the state,

it is advised that it returns its traditional functions, focusing mainly on pure public goods and services. It should concentrate in improving the efficiency of civil services. In this respect, the state should concentrate its efforts on building foundation of lawfulness, stable policy environment, basic social services, and protection of the vulnerable. To effectively perform these fundamentals, the state needs to strengthen its capability. In this regard, the World Bank (1997) recognizes three mechanisms, and one of them is to facilitate voice and partnership. Additionally, the state is advised to relinquish its economic role, which could be better accomplished by the market and voluntary organizations. The state is expected to create an environment favorable to the functioning of these organizations.

What are Private Organizations?

Private organizations (POs) are market-driven entities that operate mainly to gain profits. They have remunerative organizations and compensatory type of power and exchanges. They always consider people as customers or employees. They create wealth by undertaking production, prices, and trade activities (Uphoff, 1995). POs have resources and management skills. By using these resources and skills, they attain growth and efficiency through which they maximize profits. They provide part of the profit to the state in terms of taxes. Sometimes, they earn foreign currency which is needed by the state to pay for imports. They also provide employment to people in their factories and companies.

Before the First and Second World Wars, POs were active in establishing productive activities. They were recognized as the best instruments for growth and welfare (World Bank, 1997). However, after the Great Depression of the 1930s, which devastated the economy in capitalist countries, there had been a rethinking in the provision of goods and services through the markets. After the WWII and the emergence of new nation states, this role of POs was slowly taken over by the state of the newly created independent nations. But most states of these new nations failed to deliver the services of POs (World Bank, 1997).

As a consequence, the respective roles of the state and POs were redefined in the 1980s, in such a way that the state withdraws from activities which the private sector is capable of rendering (Giddens, 1989). Following this, the private sector is given a greater role. It begins to create a demand for their produce through a market mix strategy by providing information, including technical know-how on how to use their products. This function indicates that POs are involved in providing extension services. Consequently, they do not only increase production of commodities, but they also create employment. While providing these services, they are considered less bureaucratic, more flexible, innovative and risk-takers than the state (PPI, Nd). On the other hand, POs exhibit tendencies to create problems for society. Since they are mainly interested in profit generation, they can manipulate the market. They can create artificial scarcities to increase the prices of production inputs. Furthermore, they

reduce the exchange values of commodities so as to extract a surplus value without organizing production. They can also influence the development of rent-seeking behavior among the decision makers to make decisions in their favor (Sahn and Sarris, 1995). They can also advocate for technologies that have poor performance to increase production, simply because of the need to create the demand for their product. They tend to favor large farmers because of quantity, quality, and management considerations.

Consequently, private organizations, if they are left to themselves, would also fall short of changing the distribution of societal resources. While they may or may not increase the participation of the great majority in productive activities, as long as they are able to increase production and make profit, POs would be satisfied. In this connection, complete dependence on the private sector is not good from the societal point of view.

What are Non-Governmental Organizations (NGOs)?

Nongovernmental organizations (NGOs) are defined as voluntary organizations which are self-governing, non-profit oriented, non-partisan, and formally constituted autonomous entities (Clark, 1993). They are normative, integrative organizations with referent and legitimate power (Streeten, 1995). NGOs have myriad organizational forms and functions. The generic organizational structure of NGO is, nevertheless, simple and less bureaucratic but flexible. They are people-centered and have direct contacts with the poor. They are skilled in community mobilization but on a small scale (Clark, 1993; Farrington, et. al., 1993). NGOs conscientize and empower civil societies for greater voice and collective action (World Bank, 1997). They also advocate policies (Hulme, 1994). NGOs these days are everywhere, but they differ in scale, ownership, orientation, approach, and operational directions. They also differ in philosophy, objectives, and mode. NGOs are created as a result of state and market failures (Farrington et al, 1993). Traditionally, they were present where the state was non-existent and markets were imperfect and incomplete (Nugent, 1995). Up to now, they are active in filling the gaps where the state or private sector is ineffective or non-existent (World Bank, 1997). They are involved in the development and operation of infrastructure, supporting innovation, demonstration and pilot projects; and advocacy for and with the poor (William, 1991). Also, they articulate the needs of the weak, provide services to remote areas, motivate people, identify and address environmental threats, and enhance the production capacity of the disadvantaged (Clark, 1993; Milbourne and Murray, 2010,). Consequently, people acquire information, establish and maintain linkages, and negotiate inside and outside these agencies.

The number of NGOs has increased since the late 1980s and the share of development fund being channeled through NGOs has also been increased largely (World Bank, 1997). Because of these, they are a global force in changing the concept of development discourse toward community orientation and bringing changes to

society (Kumah, 1999). They are confronted, however, with some weaknesses. Among these are their small size, restricted impact, distance from policy decisions, professional and technical limitations, poor infrastructure, coordination, and accountability (Farrington et al., 1993). Some NGOs are created opportunistically to support the interest of privileged people. They are also faced with limited resources and short-term funding. Thus, they cannot take on long-term activities (Clark, 1993).

While they are generally less bureaucratic and apply the bottom-up approach in development, a number of them are also bureaucratic and adopt top-down development approach. In some instances, they are equally blamed for promoting financially unsustainable solutions to problems. They are also criticized for not being results-oriented, for misusing external resources, and for weakening GO efforts in many areas (Farrington et al, 1993). Yet as the poor face many problems in articulating and pressing for their demand, genuine NGOs play a vital role in channeling people's voice and building their capability. Such NGOs can be valuable partners in development and social change (World Bank, 1997). The brief analysis of the roles and power of GO, NGO, and PO indicates that there are certain sector-specific roles that cannot be transferred to other sectors. There are, however, certain areas where the interests of the three sectors coincide (Fig. 4). In the area where they have common interests, collaboration among the three sectors would be more beneficial than when they provide the services separately.

Institutional - Organizational Concept

Like the human body, organizations have many parts that are interrelated and integrated. Internally, an organization has certain goals, manpower, and procedures. Each organization interacts with the environment in which it works. The change in environment changes the situation in organization and vice versa. Development changes are generally introduced through organizations. Organizations make modern life easy due to specialization of tasks and exchange of goods and services (Katz, 1965). The organizations that induce change, protect change, and are formal become institutions and they are valued by societies as a meaningful entity (Blase, 1986). In the process of institutionalization, a complex set of interactions between the institution and environment takes place. Although institutions and organizations are interchangeably used, they have some differences. De Janvry et al (1995) and Uphoff (1995) distinguish institutions from organizations on the ground of norms, rules, behavior, and persistence to serve collectively valued purposes. These criteria that are found in an institution may or may not be present in an organization. An organization is more related to recognized and accepted structures of roles. Uphoff (1995) makes a sharp distinction between the two. Institutions have recurring patterns and are stable and valued. Organizations and procedures vary in their degree of institutionalization. In practice, however, a bulk of literature on institution building deals with building of organizational facilities, developing organizational linkages, and improving its

financial support. These different definitions make clear that an institution is broader and has many qualitative aspects (Uphoff, 1995), whereas an organization is a means to reach certain objectives (Esman, cited in Blase, 1986) and can be institutionalized after continuously serving the people and meeting normative expectations.

In this study, the market and the state are institutions, whereas NGOs may or may not be an institution. The NGOs that have developed as part of a development system can fall under the category of institution. Others that have not yet attained full development may not fall under it. Despite these conceptual differences, institutions and organizations have similar structures of roles (De Janvry, 1995). Another noteworthy observation is that a trend is increasing toward institutionalization of NGOs (Uphoff, 1995). Considering their similar roles and the NGO trend toward institutionalization, this study treats three of them equally under the category of institution. Esman (cited in Blase, 1986) identifies and describes five institutional variables - leadership, doctrine, program, resources, and internal structure. He describes a leader as a person who controls the institution's internal operations and manages relations with the external environment. Doctrine consists of purpose, objectives, and methods of operation of the institution. Program is related to the activity of the institution that produces and delivers goods and services. Resources are the physical, financial, personnel, and infrastructural inputs necessary for the operation of the institution. Internal structure includes the dispersal of authority, division of job, and line of interaction within the institution to make decisions and guide actions (Blase, 1986). Along these lines, there exists an incentive system that includes the working environment, training, promotion, salary scheme, and infrastructure, with the provision of which would make employees more productive in the process, helping which help attain organizational goals efficiently and effectively (ISNAR, 1988; and Singer, 1977).

Differences in the inceptive systems may produce different results in organizations. The organizations that have more qualified and experienced staff with need-based training, timely promotion, scientific salary schemes, and support services may perform differently from those who have less qualified and inexperienced staff. Poor motivation affects organizations adversely in their productivity attainment (Rocheteau et al, 1988).

Training. A person in the organization needs to learn techniques when new technology is introduced. Training is a way through which that person can learn and develop skills (Singer, 1977). It is necessary to maintain the present job as well as to learn skills for a future job. Not only do persons gain knowledge and skills through training, they also develop an attitude to improve on the job. Training is especially needed when new role is expected of an employee. It is expected that trainees gain increased efficiency and become more productive after the training. This way, training is beneficial for both the individual and the organization (Plunkette and Attner, 1986).

Promotion. It is a movement by a person into a position of higher pay and greater responsibilities (Lindgren and Harvey, 1981). When people are promoted, it is expected that they perform better. Plunkette and Attner (1986) point out that generally the persons who perform above average in the present job and seem to be able to assume greater responsibilities are promoted. They, however, caution that promotion is not strictly on a merit basis.

Pay. Pay is a monetary compensation for work done by a person for an organization. The compensation should meet the physical needs of workers and their families. Pay is also a symbol of status, a source of self-respect, and an avenue to security (Newman et al, 1987). Since pay is related to status, it should not be below a level that reduces the person's prestige in society. Newman et al (1987) specify that a pay scale is made on the basis of length of training and skills. They also indicate that higher pay gives incentives for workers to work harder which ultimately benefits the organization.

Position. It is a location within a social system that a person occupies to perform certain functions or roles and thereby acquires a certain level of status (Lidgren and Harvey, 1981). Position is either ascribed or achieved. Ascribed position is allocated through kinship, age, sex, ethnicity, or the like which a person cannot control. Achieved position, on the other hand, is obtained through the efforts of a person (Marshall, 1994). In an organization, position is achieved by a person who has the requisite qualifications. Each position has certain roles in the organization. The role a person plays influences the values, attitudes, and perceptions of other persons (Lindgren and Harvey, 1981). Lindgren and Harvey (1981), while illustrating an experiment of Alkire et al (1968), make the point that different positions may exert different levels of influence upon others, especially in communication efficiency. The audience listens more attentively to people in higher positions than people in lower position. In the dissemination of information, people in higher position may be more effective than those in lower position.

Linkage

For an organization to function, it should establish relationships with other organizations through linkage. Linkages are the mechanisms that hold the elements together. Thus, linkage is a relationship an organization has with other organizations on which the organization depends for resources, authority, and support (UN, 1982, cited in Blase, 1986). Blase discusses four types of linkages: enabling, functional, normative, and diffused.

The enabling linkage is established between two unequal organizations. It is a lower level organization's relation with a higher level organization, which controls the resources and exercises authority. The functional linkage is the relation with other organizations dealing with supply and marketing. Functional linkage is horizontal.

Functions here are complementary. The normative function is related to interest in social purposes. The diffused linkage is the relation with individuals or groups not linked to any other organization. These linkage variables and the organizational variables discussed above explain institutional behavior. The relationships between the two types of variables are shown in Figure 1.

To explain the linkage between NGOs and national agricultural research systems (NARS), Farrington et al (1993) draw a line of difference between linkage and collaboration. Interaction, linkage, and collaboration are related concepts but differ in certain characteristics. Interaction is the broad term, which may be positive or negative. It includes both collaboration and linkage. It may take place in either formal or informal ways and can be conflictive, neutral, or supportive (Farrington et al, 1993). Linkage may have formal or informal status. The related organizations are not interdependent but are mutually supportive. There may be information exchange, joint field visit, and local discussion fora among the related organizations. Collaboration has formal status.

Collaborating agencies implement activities jointly, and are interdependent. The success of one organization depends on the attainment of the mandates of other organizations. This is depicted in Figure 2. A further classification of linkage can be made into structural and operational types. Under the structural type, linkages are at an institutional level between linking organizations and have influence over the decisions of others to some extent. The mechanisms of structural linkages consist of coordination units, permanent committees, and representation of one organization in the decision-making body of the other. They are formal and institutionally recognized. They also last long (Farrington et al, 1993).

The operational linkage is the linkage at the activity level. They can be joint professional activities or resource allocation procedures. Joint problem diagnosis, joint priority setting, joint decision-making, joint field visits, informal consultation, joint training activities, formal guidelines, staff rotations, and fund allocations for joint activities are some operational linkage mechanisms (Farrington et al, 1993). While comparing the socio-economic development trends of 16 Asian countries for 25 years from 1952 to 1977, Uphoff (1995) found that countries having better vertical and horizontal linkages and networks had higher levels of standard of people, including per capita agricultural production, than those with less organized linkage and networks.

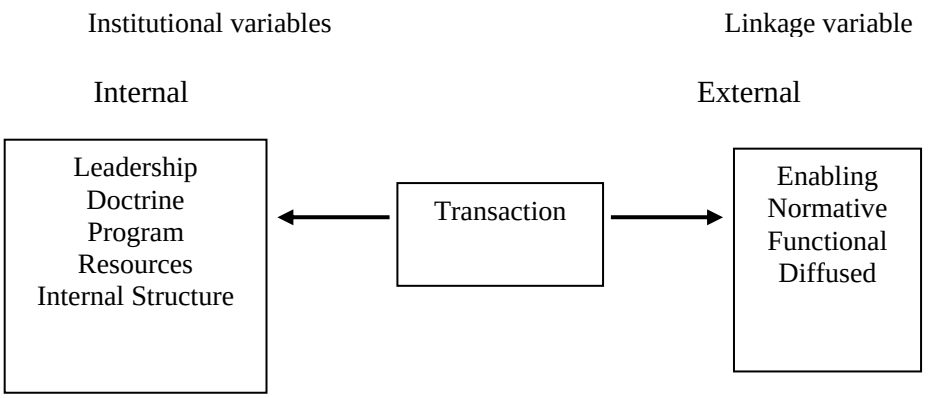


Figure 1. The institution-building universe.
Source: Blasé, 1986 (p 69)

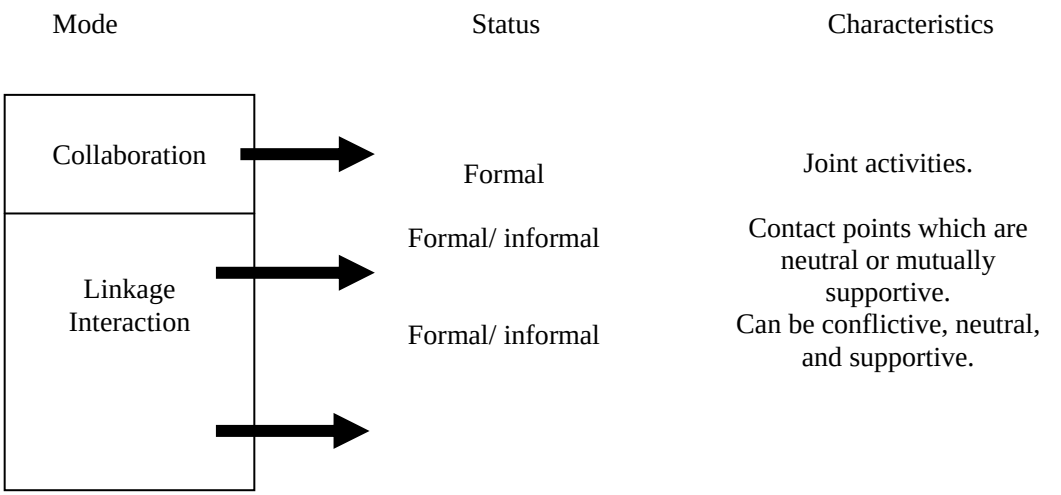


Figure 2. Modes of interaction.
Source: Farrington et al, 1993 (p 128)

Eponou (1993), while synthesizing the findings of seven case studies in developing countries about linkage between agricultural research and extension, recommends that each partner, before being involved in a partnership, should assess the strengths and weaknesses of their own and of their partners. Assessment, according to him, should include context, structure, resources, and mechanisms as well as the behavior of partner organizations. Planning and review, collaborative activities, exchange of resources, dissemination of knowledge and information, evaluation and feedback, and coordination are the areas of collaboration identified by Eponou (1993). Similarly, incentives for interaction, accountability, awareness of gains from linkages, locus of control, authority of linkage mechanisms, pressure from extension and donor, and distribution of gains from linkages should also be considered (Eponou, 1996). Jamias (1990) included personal characteristics such as degree, position, and length of service and linking mechanisms such as organizational setup, resources, training, orientation, and communication as independent variables to study their effect on involvement, research-extension interface, and training. He found personal characteristics to be significant in monitoring and resources to be significant factors for planning, organizing, coordinating, implementing, monitoring, and evaluating of research - extension activities. Tan (1984) studied intrasystem and intersystem interactions of a malnutrition prevention project. He found intrasystem interaction significant, while intersystem interaction was non-significant to program success.

Public-Private Relationship

Traditionally, public and private sectors provide goods and services to people independently. Government giving subsidies to the private sector and the private sector creating employment opportunities for the people was the *modus operandi* (De Janvry et al, 1995). Another mode of partnership can be found in projects where governments provide the funding, share information, and hire the consultants for policy development. Since the 1980s, a paradigm shift in the public-private partnership can be observed with shared commitment and risk on the part of all partners involved. Since then, the public-private partnership has been a major concern in development literature (Cullin, 1994).

On the ground of inclusion of shared commitment and risk, public-private partnership (PPP) has been defined as an arrangement in which two or more parties agree to work cooperatively toward the attainment of a mutual goal which the partners, while working alone, would be unable to attain (Kumah, 1999). The underlying assumption here is that PPP can create efficiency. For this, Kumah (1999) emphasizes that mutual understanding of the partners, building coalition with stakeholders, joint planning by all parties involved, and their shared commitment to the mutual goal are necessary.

Shah (1995) identifies and describes three important dimensions of partnership: division of responsibilities between collaborating partners, the extent and nature of

involvement, and dynamics of partnership. The division of responsibilities on the basis of relative strengths and weaknesses of the partners, their active involvement in all decision steps, and continuity in involvement enhance durable partnership. Khan et al (1991) provides information that complementarity of activities has been a key factor in partnership building that leads to durable success.

GO-NGO Relationship

A lot of work is going on about GOs and NGOs relationship. Farrington et al favor a functional relationship between these entities. Along the same line, Pretty (1995) emphasizes on working together but in an independent way. Shah (1995) talks about the task allocated to them on the basis of their respective strengths and conclude that this would lead to efficient task performance. Farrington et al (1993) and Put (1998) recommend reviewing the context under which NGOs emerged. They argue that historical, social, and economic as well as political contexts help gain an understanding about their relationship. The entire context under which NGOs emerged and the motives with which individuals joined the NGOs lead to different attitudes of NGOs toward the state. NGOs that emerged under an authoritarian administration develop an identity and culture, which makes it difficult for the NGO to create and work with the state. They have difficulties of trusting the state. Those coming from the inefficient state experience may see NGO-state relations as detrimental to the credibility of the NGO. But recent reforms in political system in many countries may change the attitude toward the state. Farrington et al (1993) explained the three factors affecting the GO-NGO relationship. These are NGO attitudes toward working with the state, state attitudes toward working with the NGOs, and legislative string imposed by the state to control finances and coordinate development activities. The doubt of NGOs is that coordinating/collaborating with the state would reduce NGO effectiveness and there would be reduced relations with the rural poor. It will also increase tension. The NGO philosophy of working with poor people would be altered. It may also endanger institutional identity and cohesion. Experiences from NGOs contracted to do extension work (Farrington et al, 1993) indicate that, in some countries, the closer link with the state has challenged their identity as an agent of change and autonomy has also been challenged by accepting pressure from external sources. State attitudes toward the NGOs depend on the type of NGOs coming for collaboration. Farrington et al (1993) describe that apolitical and market-oriented NGOs may be closer to the state than those with political advocacy. In many cases, the state views NGOs as opponents and feels that donor resources are driven to NGOs. These resources would be otherwise available for state activities (Clark, 1993). Therefore, the state imposes certain restrictions on NGO activities through legislation (Farrington et al, 1993).

Registration is one way of controlling NGO activities. The government may use certain rules to screen NGOs that may threaten their power and to support those that

have political motives supportive of the ruling party. But registration is also a way of establishing a relationship between the two entities. In some cases, the state may contract NGOs to implement state activities. To sum up the above review, literature about partnership between two agencies, either public-private or GO-NGO, is abundant. Literature on partnership among three and more agencies is lacking. With the assumption that the principles of partnership are equally applicable for two- or more-agency partnership, this study applies these principles in the three-agency partnership.

Concept of Adoption

The concept of adoption of innovation is similar to the adoption of a child. In child adoption, the couples undergo a series of mental processes about whether or not to adopt. Once they make a decision to adopt, who to adopt becomes another problem. After the selection of the child, they undergo a process to fulfill the legal requirements for their respective rights and duties. The old parents then handover the child to the new parents. The responsibilities now shift to the new parents to raise the child until the child becomes independent. An almost similar pattern follows in the adoption of innovation (Enos and Park, 1988). In the case of agricultural innovation, a farmer undergoes a series of stages and then only takes the decision of whether or not to adopt. There are five such stages as identified by Lionberger (Gwin and Lionberger, Nd): awareness, interest, evaluation, trial, and utilization (or non-utilization). This is an individual adoption process. Similar to this is a model developed by Rogers (1983). This also contains five elements such as knowledge, persuasion, decision, implementation, and confirmation. These models are widely used in technology transfer and are closely related to each other.

Another popularly used pattern in the process of transfer of technology is the categorization of technology users on the basis of how fast they adopt the innovation. This was also developed by Rogers in the 1960s (Rogers, 1983). According to this, there are five categories of farmers: innovators, early adopters, early majority, late majority, and laggards. Lionberger later modified this model with the four categories as innovators, early adopters, the majority, and late adopters (Gwin and Lionberger, Nd.). The innovators are the earliest adopters who make heavy use of research and expert source of information, whereas the late adopters rely on innovators and other farmers as source. Both of these models are very much top-down and research center-oriented and are criticized for being non-responsive. Gwin and Lionberger (Nd) gave another model, which they claim is a development worker-oriented model. In this, the problem becomes the center of the model. There are also five stages: problem, search for alternative, select the alternative, trial, and adoption.

Factors Affecting Adoption

Apart from processes that take place in the minds of innovation users, there are mainly five attributes related to innovation that influence adoption/utilization (Rogers, 1995).

- *Relative advantage*: the degree to which the innovation is perceived by the user to be useful as compared to the one being presently used.
- *Compatibility*: the degree to which it is perceived by the user to be consistent with past experiences, existing values (culture), and needs.
- *Complexity*: the degree to which it is perceived by the user to be difficult or easy to understand and use.
- *Trialability*: the degree to which the innovation can be tried in a small package and small size.
- *Observability*: the degree to which the results of innovation are visible.

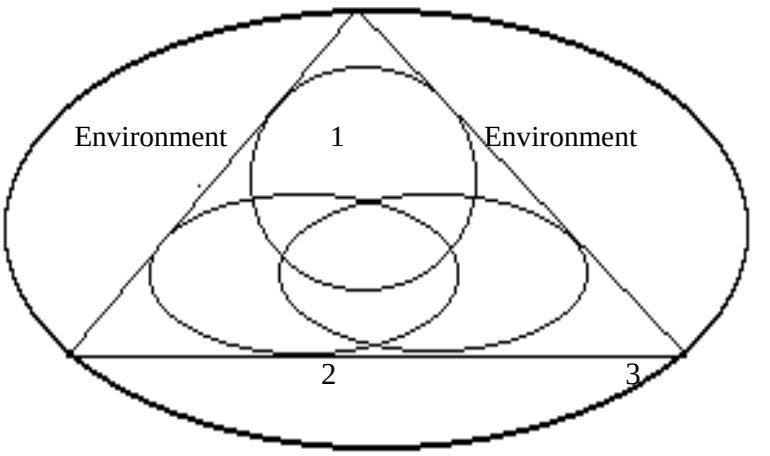
Apart from these, there are many socio-economic, technical, and institutional factors that influence adoption. To enumerate all the factors that affect the adoption of innovation is not the purpose of this study. However, the most prominent factors cannot be omitted. The significant factors that influence the adoption are *farm size* (Balantac, 1985; Parveen, 1989; Rajgopalan and Singh, 1971; Sharif et al, 1989); *income* (Balantac, 1985; Cardenas, 1981; Parveen, 1989; Rajgopalan and Singh, 1971); *tenurial status* (Rajgopalan and Singh, 1971; Saguibo, 1996); extension contact (Balantac, 1985; Parveen, 1989; Setmidjaja, 1990); credit availability (Simbolan 1992); input availability (Simbolan, 1992); and positive perception of farmers toward technological components (Cardenas, 1981). While evaluating the adoption of innovation, one of the extensively used variables is attitude. Attitude is defined as a relatively stable, persistent tendency to think, feel, and act in consistent ways regarding certain objects, events, persons, situations, or concepts (Lindgren and Harvey, 1981). Attitudes are directional in that people express them either positively or negatively. Associated with this direction are intensity, centrality, salience, and consistency. Attitudes are extensively used in the social sciences to judge the policy and program of organizations. Attitudes cannot be measured directly; they are, however, determined through an inference of the individuals' behavior. There are some techniques developed to measure attitudes. Prominent among them are the Thurstone scale and the Likert scale. The Thurston scale consists of items which are evaluated on an 11-yes-no format with equidistance. The Likert-type scale consists of items which are rated on a 5 - point scale usually with strongly agree (5) to strongly disagree (1) scores. Since they were developed in the Western context, they are not well-fitted in the developing country context. Sociologists develop their own scales and measured behaviors (Lindgren and Harvey, 1981).

Theoretical framework

Concept of Partnership

Partnership has gained prominence in social science these days. Donor communities strongly emphasize the partnership between the state, the private sector, and the civil society. Partnership can be viewed as a complementary relationship between collaborative partners. It is a shared commitment and risk on the part of all partners in the game (Cullin, 1994). It is an arrangement in which two or more parties agree to work cooperatively to attain their goal, which while working independently, they would be unable to attain. Partnership can best be described based on the exchange theory where Thibaut and Kelly (1956) talk about building and maintaining relationships. The essence of this theory is that relationship is built with the expectation that it would bring greater benefits in a relationship than in a non-relationship. In decision-making, people are rational, looking at all the options and selecting the one that gives them the most rewards at the least costs. On the contrary, if the partnership brings less rewards and more costs, there will be less chances for forging a partnership and continuing it. Therefore, partnership depends on whether or not the result of partnership is profitable to each other (Emerson, 1976). Another important area that brings partners together is resource constraint. Because of severe resource constraints, organizations would limit themselves to particular functions. To perform more functions, organizations establish relationships with other organizations to pull resources. The time value also has its own importance. The trend, at this time, has been toward working collaboratively (World Bank, 1997).

To work collaboratively, however, organizations need to fulfill certain prerequisites. These prerequisites include shared commitment and shared risk (Cullin, 1994), mutual understanding among partners, building coalition with stakeholders and joint planning, and division of responsibilities between partners (Shah, 1995). Archer and Cameron (2003) provide seven steps for successful partnership. These include Alignment of objectives, Effectiveness of communications, Clarity of decision-making, Clarity of accountabilities, Right skills in the right place, Partnering behaviour of leaders and Responsive ways of working. Other important factors contributing to successful partnering are trust building, benefiting all partners, vision and role clarity (Nick Jankel, 2009).



1 = Organization 1

2 = Organization 2

3 = Organization 3

Figure 3 Configuration of different organizations

Conceptual Framework

GOs, NGOs, and POs can form a partnership to gain benefits from each other and also to give more benefit to society. However, they need to putdown the conditions of partnership before they forge. A number of conditions for the collaboration between GO, NGO, and PO can be traced. They should have shared objective (Clark, 1993). The GO, NGO, and PO do not share common objectives, at large, when viewed from the traditional point. In the present context, there are, however, certain areas where these organizations have common interests to fulfill their respective objectives. Agriculture production, for example, is a common area of interest (World Bank, 1997).

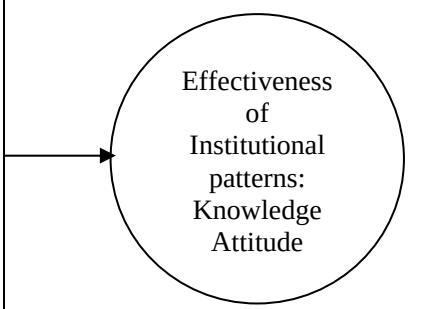
To the state, agricultural production is a means of providing food for the people. Agriculture also provides the raw materials for industries and, at the same time, it earns hard currency to pay for imports. To the PO, agriculture is an area of interest because it can supply more inputs for production, while it gets a sizable volume for trade. To the NGO, income generation has become a necessary first step toward preparing the people for development. In this respect, agriculture is one of the gainful activities with the help of which they get easy entrance to society for their activities (CEAPRED, Nd). Secondly, agriculture is the area where NGOs can show some quick results. This helps NGOs to deflect the blame put upon them that they are limiting only on process. Agricultural production, therefore, is an area of common interest to GO, NGO, and PO. Through their collaboration in agriculture development, the possibilities of NGO being scaled up, the GO being more effective and efficient, and the PO getting monetary profit from more private sector role are there. Under the assumption that in a mutually benefiting enterprise such as agriculture, the institutions can form a partnership and continue working collaboratively.

This study conceives GO, NGO, and PO and their four possible combinations as institutional patterns. GO, NGO, and PO are individual institutional patterns and the four combinations made by these three patterns -- GO+NGO, GO+PO, NGO+PO and GO+NGO+PO -- are partnership institutional patterns. This study intends to evaluate the effectiveness of these seven patterns. These seven institutional patterns have their own characteristics, resources, approaches/methods, personnel policies, and linkage patterns which may vary from each other. This study presumes that the variation in these characteristics explains the difference in effectiveness in extending agricultural technologies to farmers. Below are the major variables and their specific components. Institutional patterns, personnel characteristics, personnel incentive, resources, linkage, and approaches/methods are the major independent variables. The components of these major variables are the following:

- Institutional patterns: GO, NGO, PO, GO+NGO, GO+PO, NGO+PO, GO+NGO+PO
- Personnel characteristics: education (years in formal school), position (present position), experiences (in similar job)
- Personnel incentives: pay, promotion, and training
- Resources: operational budget, manpower, and materials/supplies
- Process: participation in extension activities undertaken under each institutional pattern: demonstration, training, field visit, farmers' day, use of print materials, input supply, output marketing, farmer organizing, farmer motivating, record keeping.

The dependent variable in this study is institutional effectiveness. Effectiveness was measured in terms of knowledge, attitude and practice of farmers about the technologies on sunflower, hybrid maize and farmer preferred rice.

INDEPENDENT VARIABLE	DEPENDENT VARIABLES
Institutional Patterns	Factors related to Effectiveness
GO NGO PO GO+NGO GO + PO NGO+PO GO + NGO + PO	Personnel Characteristics Education Position Experience Incentives Pay Promotion Training Resources Operating budget Manpower Materials / supplies Process. Participation in Extension Activities Demonstration Training Field visits Farmer day Farmer motivating Farmer organizing Input supply Output marketing Record keeping



Research hypotheses

The Interagency partnership extension pattern is more effective than individual extension pattern in extending agricultural technologies to farmers.

On the other hand, the effectiveness of institutional extension patterns is conditioned by personnel characteristics, personnel incentives, resources, and extension activities if the linear relationship between these factors and effectiveness is at least moderate.

Sub-hypothesis

- The effectiveness of institutional patterns in providing extension services is influenced by personnel characteristics of extension agents in terms of degree, position, and experience.
- The effectiveness of institutional patterns is influenced by personnel incentives of institution such as pay, promotion, and training.
- The effectiveness of institutional patterns is influenced by institutional resources such as operating budget, manpower, and material/supplies.
- The effectiveness of institutional patterns is influenced by extension methods they used such as demonstration, training, field visit, farmer's day, farmer motivation, farmer organizing, input delivery, output marketing, and record keeping.

Definition of Terms

Institutional patterns refer to ways of delivering services to a client in an organized manner. In the present study, GO, NGO, PO and their various partnerships are considered institutional patterns. Government organization (GO) refers to organizations under the control of the government. The government extension system, whether at the national, regional, district, subdistrict or community level, is considered as GO in this study. Nongovernment organization (NGO) designates the not-for-profit private autonomous organization, which is registered with the legitimate government authority and is involved in development activities.

Private organization (PO) refers to the profit-making private entrepreneur which is registered with a legitimate government authority and is currently supplying agriculture inputs.

1. GO+NGO refers to the interagency partnership pattern between GO and NGO.
2. GO+PO refers to the interagency partnership pattern between GO and PO.
3. NGO+PO refers to the interagency partnership pattern between NGO and PO.
4. GO+NGO+PO refers to the interagency partnership pattern among GO, NGO, and PO.

- Personnel characteristics designate the traits of field workers in terms of their degree, position, and experiences.
- Education pertains to the highest academic achievement, which was measured by the number of formal school years attended by a respondent.
- Experience refers to the length of service in years related to the present work of the respondent.
- Incentives refer to the reward given by an institutional pattern in exchange for work performed by the field worker. These include pay, promotion, and training.
- Pay refers to the annual salaries, allowances and other fringe benefits that a field worker received while rendering service during the period 1997-98.
- Promotion refers to a higher position offered to a worker in the organization. The number of promotions obtained by each field worker during the last 5 years was counted.
- Training pertains to the non-formal continuous education of a field worker. Whether or not a field worker underwent a training course was measured. A total of number of days an agent participated in various training programs from January 1, 1994 to December 31, 1998 was considered.
- Resources designate the institutional resources pertaining to operational budget, manpower and materials/supplies allocated for carrying out the planned individual and joint activities related to this research.
- Operational budget applies to the individual financial contribution of each institution to implement agreed upon activities during the period October 1, 1997 to December 31, 1998.
- Manpower indicates percentage of total time spent by respondent staff to this research during the period October 1, 1997 to December 31, 1998.
- Materials indicate extension materials such as demonstration materials, transport facilities obtained by field workers for the implementation of agreed upon activities from their respective institutional patterns.

Process refers to the dynamics of conducting extension activities by institutional patterns. The following elements were considered under the process: input supply, output marketing, motivating farmers, organizing farmers, demonstration, training, field visits, farmers' day, and record keeping. The level of achievement was measured by using the following scale:

1. Full achievement	100% of targeted activities fulfilled
2. High achievement	67 - 99%
3. Average achievement	34 - 66%

4. Low achievement	01 - 33%
5. None at all	0% achievement of targeted activities

- Demonstration refers to the extension technique wherein the recommended technology and its application were shown to farmers in a small plot of land.
- Farmer training refers to the non-formal learning activities among farmers intended to provide technical information about hybrid maize, rice, and sunflower. Informal discussions by a field worker regarding related technologies were also considered training.
- Field visit refers to the extension technique wherein extension agents make visits to farmers' fields.
- Farmer's day applies to an extension technique where extension agents bring other farmers to a demonstration field to have face-to-face interaction with farmers who own the demonstration plots.
- Motivating farmers refers to stimulating farmers to gain more information about the technologies on hybrid maize, farmer-preferred rice, and sunflower with the purpose of making them ready to accept these technologies. A farmer who adopted the recommended seed variety was considered a motivated farmer.
- Organizing farmers refers to the process of forming groups of farmers and make them ready to accept new agricultural technologies. The number of farmers who formed groups and undertook any activity related to this research was counted. Members in existing groups who performed activities relating to this research were also considered.
- Input supply pertains to the supply of seeds, fertilizer, micronutrients, and chemicals required by farmers or partner organizations in connection with extending and accessing the hybrid maize, rice, and sunflower technologies.
- Output marketing refers to undertaking an actual part in marketing or helping farmers get hybrid maize, rice, or sunflower marketed.
- Record keeping refers to the maintaining of a record, journal, or account with regard to activities done while extending the agricultural technologies to farmers.
- Effectiveness of a pattern refers to the percentage of farm households adopting recommended seed variety of hybrid maize (HM), farmer-preferred rice (FPR), and sunflower (SF). A pattern is said to be more effective than the other if the difference between the two patterns is, at least, 51 percent. Similarly, if the effectiveness percentage of a pattern is above the average effectiveness among more than two patterns in comparison, the pattern is effective; otherwise, not.

- Knowledge refers to cognitive scores received by respondents on technologies about hybrid maize, FPR, and SF. Farmers were asked to name recommended components of technologies in their areas. If the respondent mentioned the following technology, it was classified 'known'; otherwise, 'not known.'

Variety: If any one of the following varieties were mentioned, it was considered 'known'; otherwise, 'not known.'

HM: Bioseed, Shanker, Shriram, Pioneer

FPR: Sworna, Pant-10, PNR-381, PR-106, Radha-11, Radha-12

SF: Modern dwarf, Vikie, Mahyco

If the following seed rates (kg) per kattha[3] were mentioned, 'known'; otherwise, 'not known.'

HM: 0.70 – 1.00

FPR: 2 – 3

SF:0.2 – 0.4

If the following fertilizer rates were mentioned, 'known'; otherwise, 'not known.'

Fertilizer (kg) per kattha	Urea	DAP	Potash
HM	6.00 – 7.00	3.00 – 5.00	2.00 – 3.00
FPR	6.00 – 8.00	2.00 – 3.00	1.50 – 2.00
SF	3.00 – 4.00	3.00 – 4.00	1.00 – 2.00

[3] Local measurement unit (29.5 Kattha = 1 hectare)

If the following insects and corresponding measures were told, ‘known’; otherwise, ‘not known.’

1. HM		Insects	Control measures
	1.1.	Cutworm	Malathion, mechanical
	1.2.	Army worm	Thiodan, mechanical
	1.3.	Borer	Furadan, Thiodan
	1.4.	Caterpillar	Decis, Repcard, mechanical, Malathion
	1.5.	Whiteants	Malathion
	1.6.	Mole cricket	Malathion, Thiodan
2.FPR	2.1.	Borer	Furadan, Thiodan
	2.2.	Hispa	Malathion Thiodan
	2.3.	String bug	Malathion, BHC, Thiodan, Diptrex
	2.4.	Aphid	Furandan, Thiodan
	2.5.	Moth	Malathion, light trap
3. SF	3.1.	Caterpillar	Repcard, Thiodan, Malathion
	3.2.	Borer	Furadan
	3.3.	Leaf eater	Folithion, Sumithion, or Nuvan
	3.4.	Cutworm	Aldrin

If the following disease and corresponding measures were mentioned, ‘known’; otherwise, ‘not known.’

		Disease	Control measures
HM	1.1.	Stem rot	Balanced use of fertilizer
	2.1.	Cob rot	Use of healthy seeds
	3.1	Downey mildew	Kerathane
	4.1	Blight	Seed treatment with Thiram
FPR	2.1.	Blast	Hinosan
	2.2.	Bacterial leaf blight	Low use of N fertilizer, Seed treatment
	2.3.	Brown spot	Dithane -M 45 (DM - 45)
SF	3.1.	Blight	DM - 45, Blitox
	3.2.	Root rot	Drain water
	3.3.	Seed rot	Captan or DM - 45

If the following weeds and corresponding control measures were mentioned, ‘known’; otherwise, ‘not known.’

	Weeds (all crops)	Weed Control Measures
1.	Madila	Pull out
2.	Banso	Pull out
3.	Jwane	Pull out
4.	Dubo	Pull out
5.	Sama	Pull out
6.	Gandhe	Pull out
7.	Bethu	Pull out

If the following irrigation stages were named, ‘known’; otherwise, ‘not known.’

		Irrigation Satges
1. HM	1.1.	3 - 4 leaves
	1.2.	Knee high
	1.3	Tasseling
	1.4.	Grain formation
2. FPR	2.1.	Always, when land gets dry
	2.2.	Drain water when diseases
3. SF	3.1.	Planting, 25 days after sowing (DAS)
	3.2.	Growing, 60 DAS
	3.3	Fruiting

If the following storage problems and corresponding remedies were named, ‘known’; otherwise, ‘not known.’

		Storage problem	Control
1. HM	1.1.	Weevil	Dry well , Malathion, BHC, Celphos
	1.2.	Rat	Rodenticide, mechanical killing
	1.3	Fungus	Dry
2. FPR	2.1.	Moth	Neem
3. SF	3.1.	Rat	Rodenticide, mechanical killing

If the following sowing distance were specified, ‘known’; otherwise ,‘not known.’

Sowing distance (cm)	RXR	PXP	Depth
SF	60	30	5

Drying: if respondent mentioned the days of drying with, at least, a reason ‘known’; otherwise, ‘not known.’ Marketing: no agent gave marketing information, so it was considered ‘not known’ for all respondents. Attitude refers to a state of readiness to respond or react to an object or situation. In this study, attitude referred to the favorable or unfavorable expression of farmers toward the program and implementing agencies. The Likert scale -- strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1) -- was used. Practice applies to the use of recommended technologies on HM, FPR, and SF by farmers. Farmers were asked to supply information about what components of technology they had used in the immediate past cropping season. In many cases, the researcher visited the crop plots to crosscheck crop condition. Use of the technologies as mentioned under ‘knowledge’ above were classified ‘used recommended technology; otherwise, ‘not used.’

Partnership pertains to two or more organizations working together in a planned and coordinated way to perform work related to extending agricultural technology to farmers. In this study, four types of partnerships were formed: NGO+GO, NGO+PO, GO+PO, and NGO+GO+PO.

Agricultural technologies refer to the set of 11 technologies such as variety, seed rate, fertilizer, insect control, disease control, weed control, irrigation, storage, drying, spacing, and market information introduced under the project for the improved production of HM, FPR, and SF.

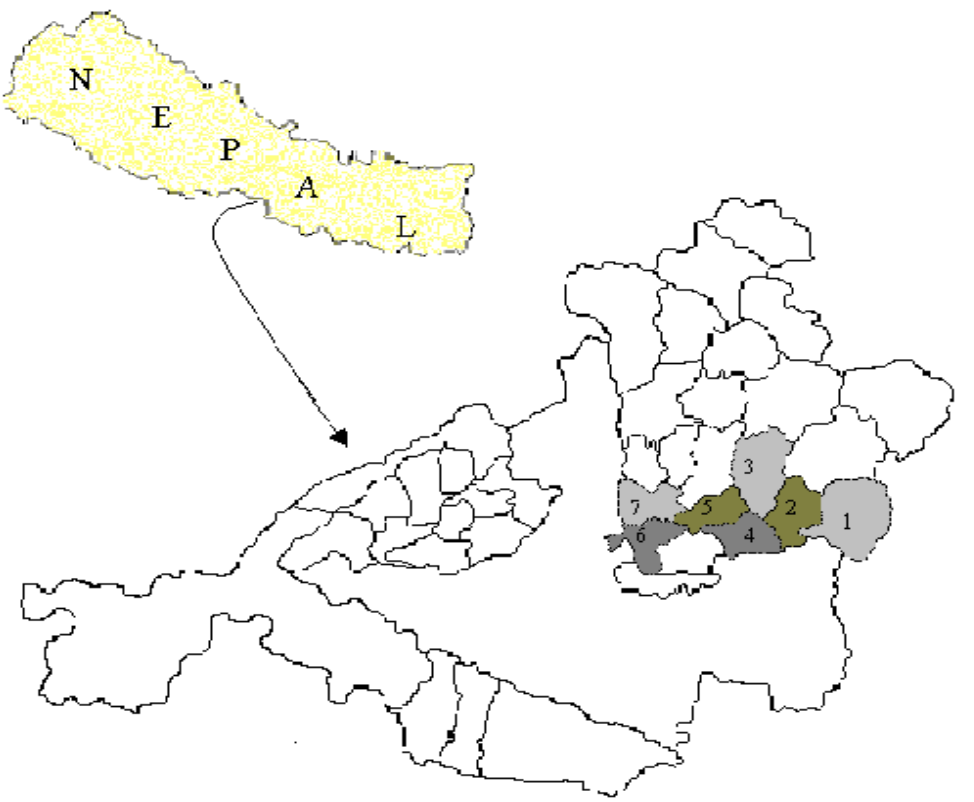
Research methodology

This research was designed to collect data in four stages. The first set of data was collected from April to June 1997. During this time, the researcher, supported by an IRRI scientist, scanned the community to select research sites, partners in collaboration, and the technology to be studied. The second set of data on hybrid maize technology was collected from June to July 1998 after the maize harvest. The third set of data on rice technology utilization was gathered from October to November 1998 after the rice harvest. The sunflower data were collected in December 1998. The

processes employed by partner organizations in connection with this research were observed and recorded from April to December 1998.

Selection of study site, GO, NGO, and PO

Field observations and informal and formal discussions with farmers, staff of GOs, NGOs, and POs were the main methodologies used to select the study sites and participating agencies. Discussions were held with more than 200 farmers from 38 communities in 11 village development committees (VDC) and two municipalities in Chitwan District, Nepal. Similarly, 58 personnel of 20 organizations including NGOs (5), POs (6), and GOs and semi-GOs (9) were contacted. This process helped select the research site, the partners and the technologies under study.



1. Piple
2. Bhandara
3. Birendranagar
4. Kathar
5. Khaireni
6. Bachhauli
7. Ratnanagar

Figure 5. Chitwan District showing the study areas.

Selection of Research Sites and Partner Agencies

The following criteria were used for the selection of research sites and partner agencies.

Chitwan District	Largest number of NGOs and POs in the rice growing *Tarai* region as noted by the Social Welfare Council (SWC), Kathmandu.
East Chitwan	Assured irrigation facilities and villages being more homogeneous in terms of accessibility to road and other related facilities.
VDC	Easily accessible to roads and communication.
Village	Desire of villagers to participate in this research and exposure to agricultural technologies.
NGO	Working in agriculture and extending agricultural information to farmers and willingness to participate in the research. Recommendation of POs and GOs.
PO	Agro-vets dealing with farmers in Chitwan, especially in the east. Recommendation of participating GOs and NGOs.
GO	DADO is the major GO which provides agricultural technological information to farmers.

Extensive discussion with the above organizations and farmers helped describe the prevailing farming systems, identify farming problems and potential and technological needs.

Site Selection

Based on the above selection criteria, seven VDCs (Piple, Bhandara, Bachauli, Birendranagar, and Khairahani, Kathar, and Ratnanagar municipality) in East Chitwan were selected for this study (Figure 5). In eastern Chitwan, irrigation and other infrastructure facilities were more uniform than in other parts of the District. A brief description of Chitwan District, including GOs, NGOs and Pos, is given in Annex C.

Choosing Collaborating Partners

After an analysis of their capabilities, interests, and recommendations from collaborating partners, the following institutions were selected for this study.

- GO: District Agriculture Development Office (DADO)
- NGO: Local Initiatives for Biodiversity Research and Development (LI-BIRD), East Chitwan Office and Rural Reconstruction Nepal (RRN), Chitwan
- PO: Inter Nepal Agrovet, Narayangarh, Chitwan

This initial selection of participating agencies was further refined as needed. Inter-Nepal Agrovet, due to its busy schedule in other activities, shifted its field level responsibilities to Kisan Agrovet Sewa, Ratnanagar, Narayani Agrovet, Ratnanagar and Beera Agrovet of Bhandara. Work responsibilities were mutually allocated as shown below in Tables (1 and 3).

Identification of Technological Package

The technological package to be delivered by the different extension agencies was identified on the basis of the expressed desires of the farmers and staff of NGO, GO, and PO after a series of individual as well as combined discussions with them. The possible packages were blast prediction kit, introduction of reapers and threshers, hybrid rice package, hybrid maize package, sunflower, and new variety or crop with balanced nutrient. The identified partners agreed tentatively in a meeting on sunflower, hybrid maize, and farmer-preferred rice variety. After this decision of partner agencies, the researcher interacted with key farmers in all selected sites. After getting their positive response, it was finally decided that this study would focus on sunflower, hybrid maize, and farmer-preferred rice variety.

Table 1. Division of responsibilities among GO, NGO, and PO.

SITE	PATTERN		T	A	S	K[4]		
		Input supply	Market	Organizing farmers	Motivating farmers	Training	Tech info	Record keeping
1	GO	1	1	1	1	1	1	1
2	NGO	2	2	2	2	2	2	2
3	PO	3	3	3	3	3	3	3
4	GO+NGO	2	2	2	2	1,2	1	1,2
5	GO+PO	3	3	1	1	1	1,3	1,3
6	NGO+PO	3	3	2	2	2	2,3	2,3
7	GO+NGO+PO	3	3	2	2	1	1,3	1,2,3

1 = GO, 2 = NGO, 3 = PO

[4] 1 = GO, 2= NGO, 3 = PO

Two separate memoranda of understanding (MOUs) were prepared (one with LI-BIRD and another with other partners). The MOUs contained the crop technology to be studied, the sites for research, and the responsibilities of each partner in the study program (Appendices 5 and 6). Fifteen field staff of participating agencies attended a 5-day orientation training on sunflower, hybrid maize, and rice farming in September 1997.

Determination of the Population

Each institution was considered as a population. Farmers served by each institution in the use of agricultural technologies related to hybrid maize, farmer preferred rice, and sunflower were the subjects of this study. Similarly, field workers and chiefs of offices of participating organizations formed another set of population.

Sample and Sample Size

There was a complete enumeration of field workers deployed by participating GO, NGO, and PO for this study. Originally, this study was designed to draw independent samples randomly from among the farmers served by each institutional pattern. However, this was modified to complete enumeration due to the smaller number of farmers adopting the recommended technologies for some patterns (Table 2).

Table 2. Distribution of respondents, by sites.

INSTITUTIONAL PATTERN	STUDY SITE	NUMBER OF ADOPTERS
GO	Samanpur, Kathar	7
NGO	Simara and Nayabasti, Piple	17
PO	Bachhauli village, Bachhauli	5
GO+NGO	Simaltari and Pipra, Khaireni	22
GO+PO	Beluwa and Daduwa, Bhandara	52
NGO+PO	Fivegroup, Birendranagar	14
GO+NGO+PO	Jayamangala and Ghegauli, Ratnanagar	6
Total	-	123

Data Gathering

The original design included data to be gathered to describe the following processes of different delivery patterns: 1) preparation of joint plan of action; 2) participation in orientation training, and LI-BIRD-sponsored focused group discussion (FGD) of and farm-walk program (FWP).

However, LI-BIRD did not conduct the FGD and FWP during the study period. So, data on these activities were not gathered. In addition, joint monthly meeting was added to earlier activities. Data on this activity were gathered.

Activities of Various Institutions Observed in the Implementation of Extension Project in the Selected Sites

Guided by the MOU, the agencies developed an action plan to implement the activities. The researcher collected information based on the following action plan. The individual institution's responsibilities were input supply, organizing and motivating farmers, training, meeting, field visit, demonstration, and record keeping.

The performance of institutions on these activities was scored and the percentage of achievement of given target activities was used to compare institutional performance. To compare the effectiveness of institutional patterns, data on farmers' knowledge, attitude, and practices about the three crops (HM/FPR/SF) were collected using the following indicators.

1. Number of farmers using recommended HM, FPR, and SF technologies
2. Knowledge of farmers on recommended technologies about HM, FPR, and SF
3. Attitude of farmers toward technologies and extension agents
4. Reasons for use and non-use

For the partnership patterns, the responsibilities were divided as shown in Table 3.

Table 3. Division of responsibilities between and among partner agencies.

	GO	NGO	PO
GO+NGO	Demonstration, training, field visit, participation in joint meeting, and record keeping	Motivating and organizing farmers, farmer group meeting, arrangement for input supply and output marketing, and record keeping	
GO+PO	Demonstration, training, field visit, organizing and motivating farmers, participation in joint meeting, and record keeping		Input supply, output marketing, post harvest info, field visit, participation in joint meeting, and record keeping
NGO+PO		Meeting, training, visit, organizing and motivating farmers, and record keeping	Input supply, output marketing, post harvest training, field visits, and record keeping
GO+NGO+PO	Demonstration, training, meeting, field visit, participation in joint meeting, and record keeping	Organizing and motivating farmers, field visit, meeting, and record keeping	Input supply, output marketing, field visit, postharvest info, participation in joint meeting, and record keeping,

Research Instruments

Semi-structured interview schedule, checklist, tape recorder, photograph, and diary were used to gather data from different groups of respondents. Three sets of semi-structure interview schedules consisting of both open-and-close-ended questions were designed and used to get information from three groups of respondents: (a) farmers to determine effectiveness (Appendix 1); (b) extension agents to determine institutional factors (Appendix 2); and (c) office chiefs to assess perception toward partnership (Appendix 3). A checklist was used for extension agents and office chiefs. Similarly, a tape recorder was used for the office chiefs. The diary was extensively used to note the important points of almost all activities. Photographs of important events and crop situations were taken.

Pretesting of the Instrument

The interview schedule originally prepared in English was translated into Nepali language and the translated interview schedule was pretested among farmers not covered by the project. Modifications were made based on farmers' pretest responses.

Administration of the Instrument

Data were collected through face-to-face interaction by using the interview schedule. The interview was done at the farmer's house and also at the field where the crops can be observed. In many cases, the other members of the household (HH) were present. This helped in getting more accurate information. For instance, the husband would ask the wife for some points of confirmation and vice versa. They would discuss related ideas and finally reach a conclusion. Since the researcher was himself interviewing the farmers, it was not tiresome but was rather interesting.

The researcher, using an interview schedule and a checklist, interviewed the extension agents also. Office chiefs filled up the questionnaire and were interviewed afterward. The interview was recorded on tape. In some cases, informal discussions were done. These were the more important means to get in-depth information.

Method of Data Analysis

Total scores on HM, FPR, and SF were analyzed by using both qualitative and quantitative techniques. Qualitative analysis was done to describe the process applied by different institutions in the study. Quantitative analysis involved descriptive statistics such as frequency count, means, proportion, percentage, and Pearson's product moment correlation coefficient. Originally, the study was designed to use the Mann-Whitney test and regression analysis. Since the data were collected under complete enumeration, these inferential statistics were not used. The Institutional pattern was the unit of analysis.

Scoring Techniques

The following techniques were used to score and compute the effectiveness of institutional patterns in terms of knowledge, attitude, and practice. Technology in this study consisted of the following 11 components: variety, seed rate, spacing, fertilizer, insect, disease, weed, irrigation, drying, storage, and market information. Each component carried a score of 1. The highest possible score, therefore, was 11 for a respondent. Since some of these components had subcomponents, the score of 1 for the component was evenly distributed among or between the corresponding subcomponents. Each component was computed as follows:

Scoring of farmers' knowledge on each component of technology		
Technology	Scoring procedure	Score
Variety	Known at least one recommended variety	1
Seed rate	Known recommended seed rate	1
Spacing	(Row to row + plant to plant + depth) / 3	1
Fertilizer	(Urea + DAP + muriate of potash) / 3	1
Insect	(Insect identification + control measure) / 2	1
Disease	(Disease identification + control measure)/2	1
Weed	(Weed identification + control measure) /2	1
Irrigation	Maize (Stage 1 + stage 2 + stage 3 + stage 4) / 4	1
	Rice (Stage 1 + stage 2) / 2	1
	Sunflower (Stage 1 + stage 2 + stage 3) / 3	1
Drying	Drying method known	1
Storage	(Storage problem + control measure) / 2	1
Market information		1
Total scores (K_f)		11

Scoring on farmers' attitude toward technology	
Total score of attitude of individual farmer (A_f)	Sum of scores of the 10 statements

Scoring of farmers' practice on each component of technology. The scores on farmers' practice were computed as follows:		
Technology	Scoring procedure	Scores
Variety	Use of at least one recommended variety	1
Seed rate	Use of recommended seed rate	1
Spacing	(Row to row + plant to plant + depth) / 3	1
Fertilizer	(Urea + DAP + muriate of potash) / 3	1

Insect	Insect control measure	1
Disease	Disease control measure	1
Weed	Weed control measure	1
Irrigation	Maize (Stage 1 + stage 2 + stage 3 + stage 4) / 4	1 or
	Rice (Stage 1 + stage 2) / 2	1 or
	Sunflower (Stage 1 + stage 2 + stage 3) / 3	1
Drying	Use of drying method	1
Storage	Control measure of storage problem	1
Market information		1
Total scores (P_f)		11

The scores obtained were used to form an index by using the following formula:

$K_{if} = K_f/11$

$A_{if} = A_f/50$

$P_{if} = P_f/11$

where, K_f = total score of the correctly answered recommended technologies by each respondent,

A_f = total score of each respondent on 10 statements about the recommended technologies,

P_f = total score on technologies used by each farmer as per recommendation,

K_{if} = knowledge index of individual farmer,

A_{if} = attitude index of individual farmer, and

P_{if} = practice index of individual farmer.

$KAP = K_{if} + A_{if} + P_{if}$

Where, KAP = knowledge, attitude and practice index

Measurement of Effectiveness

Based on the conceptual framework, the effectiveness of a pattern was measured by using two alternate formulas:

Initially, the effectiveness of the pattern in terms of KAP used the following formula:

Effectiveness of pattern (KAP_f) = $\frac{\Sigma(K_{if} + A_{if} + P_{if})}{N}$

However, insufficient and extremely unequal number of adopters was found in the study across institutional patterns which also did not allow the ideal drawing of a random sample from which to analyze effectiveness based on the above formula. Hence, an alternate formula was used. This formula was a departure from what was presented in the original conceptual framework. This formula is as follows:

$$\text{Effectiveness of a pattern (E)} = \frac{\text{Number of husehold adopters}}{\text{Number of households}} \times 100$$

Measurement of differences

The difference in effectiveness of two independent groups was calculated as

$d = (X - Y)/Y*100$

X = effectiveness score in non-reference pattern

Y = effectiveness score in the reference pattern

* = sign of multiplication

Decision Criteria

While comparing the two patterns, a pattern was considered effective, if d was equal to or greater than 51%; otherwise, not.

While comparing more than two patterns, a pattern is effective if it falls above the average KAP of patterns in comparison; otherwise, ineffective.

Results and discussion

Socio-demographic Characteristics of Farmer Respondents

Sex, age, caste, marital status, family size, education, farm size, tenure status, ownership of electric appliances, transport, farm implements, lighting facilities, and power were used to describe the socio-demographic characteristics of respondents in this study. These characteristics were compared patternwise in Tables 4, 5, and 6. Table 4 shows the personal characteristics of respondent farmers such as sex, age marital status, and education.

- *Sex*. The respondents in the GO, PO, GO+PO, and NGO+PO sites were predominantly male (86%, 100%, 87% and 79%, respectively) whereas respondents in the NGO and GO+NGO sites were predominantly female (88% and 68%, respectively).. The GO+NGO+PO site had an equal proportion of male and female respondents. The reason for the site being gender-specific is that the NGO's target clients were generally female. However, males were the respondents in areas where the program was extended beyond the target members.
- *Age*. Table 4 also reveals that all respondents were at the expected age of maturity and were able to make sound decisions regarding farming. Younger farmers, 45 years or less, were more (72%) than the older farmers. There was no sharp difference in age across the pattern.
- *Education*. A sharp difference in education was observed across the patterns. In general, respondents with no or low educational attainment (up to grade 5) were greater in areas where there was NGO involvement. It is because the NGOs' specific target population was the poor and disadvantaged. Respondents who finished grade six or higher were the majority in other areas.
- *Marital status*. Table 4 also divulges that most of the respondents (92%) were married people. Unmarried and widows composed a small fraction of the respondents.
- Family-related information such as caste, family size, farm size, tenure strata, and additional income are shown in Table 5.
- *Caste*. Caste is an important social structure in South Asia, including Nepal. The upper caste Brahmin and Kshetry comprised the majority in GO (71%), GO+PO (92%), and GO+NGO+PO (100%) sites. The NGO (65%) and NGO+PO (71%) sites were dominated by tribes of Mongolian origin. The traditional inhabitants, *Tharus*, composed the majority in GO+NGO (64%) and PO (100%) sites. This is because the NGOs' target groups were the lower caste and traditional inhabitants under GO+NGO pattern, whereas the partner PO was also *Tharu* in the PO site.
- *Family size*. The medium-sized family member with 5-8 is common in all patterns, except at PO and GO+NGO+PO sites where families with 9 and more members

were found. The PO site is a *Tharu*-dominated area. This tribe generally tends to have a large family size. At the GO+NGO+PO site, the recommended technology users had a large family size. Their children were still living in the same house. Households with small family size totaled 15 percent, and none of the households was under this category at the GO and PO sites.

- *Farm size*. None of the HHs was landless. Small-sized (0.5-2.00 ha) farms were found in all sites, except at the PO and GO+NGO+PO sites, where a majority (60% and 50%, respectively) were medium-sized farms. Respondents with large farms (more than 4.00 ha) were present in the GO and GO+PO sites. Again, NGOs working with small and marginal farmers and other agencies being nonspecific to any group were found.

Table 4. Personal characteristics of farmer respondents.

Characteristic	Pattern	GO N=7	NGO N=17	PO N=5	GO+NGO N=22	GO+PO N=52	NGO+PO N=14	GO+NGO+PO N=6	TOTAL N=123
		PERCENT							
Sex	Male	86	12	100	32	87	79	50	64
	Female	14	88	0	68	13	21	50	36
	Total	100	100	100	100	100	100	100	100
Age	30 and lower	43	0	40	41	25	21	33	29
	31 - 45	43	59	60	41	40	43	17	43
	46 - 60	14	35	0	9	17	29	17	17
	60+	0	6	0	9	17	7	33	10
	Total	100	100	100	100	100	100	100	100
	Mean	35	45	33	36	42	41	45	41
	Range	19 - 54	33 - 63	27 - 38	21 - 62	20 - 69	22 - 68	17 - 66	17 - 69
Education	Illiterate (cannot read and write)	0	82	0	36	12	14	17	25

	Literate without formal schooling	14	12	0	18	25	21	50	21
	Primary (1 - 5 years)	14	0	0	14	12	36	0	12
	Secondary (6 - 10 years)	14	6	60	23	25	21	17	22
	BS level (11 - 14 years)	29	0	40	9	25	7	17	17
	Above14	29	0	0	0	2	0	0	2
	Total	100	100	100	100	100	100	100	100
Marital status	Married	100	94	100	95	88	93	83	92
	Unmarried	0	0	0	0	10	7	17	6
	Widow	0	6	0	5	2	0	0	2
	Total	100	100	100	100	100	100	100	100

- *Sources of income*. Many farmers have other sources of income in addition to agriculture. These included non-farm services, trade and business, and farm labor.
- *Tenure*. Most of the respondents (71%) were owner cultivators except in the GO+NGO+PO pattern. In the latter pattern, one-half of the respondents were owner cultivators and the rest leased out their part of the land. Some respondents not only cultivated their own land but also leased land from others. The respondents cultivating other lands were found in the GO+NGO pattern.
- Farm size, income (other than from agriculture), and tenure status were closely related characteristics. The small farmers who had no HH member in non-farm services obtained or leased land from other farmers whose family members were engaged in non-farm services. Table 6 presents the household acquisitions of farmer respondents such as electronics, transport means, farm implements, lighting, and power facilities.

- *Household appliances*. None of the respondents under the PO pattern owned radios. The respondents in this pattern were all *Tharus,* who have a culture of constructing houses closely and sharing items with each other. When a radio is played in one house, people from other HHs are welcome to listen. Every site had television (TV) except at the NGO site, where electricity was not yet installed. The GO site had no electricity installed, but one person had a TV run by battery. Refrigerators were found in two sites with two respondents. These respondents had provision stores, which needed refrigerators as additional source of income.
- *Transport*. The bicycle is a popular means of transport in Chitwan and in the study sites. The study sites located relatively farther from the roads had 100 percent bicycle owner respondents, except at the NGO site. It was likely that economic factors did not permit the respondents to buy bicycle in this site. At the GO, GO+PO, and GO+NGO+PO sites, a few of the respondents owned motorcycles, specially used for activities other than farming. The motorbike owners generally were those who had high additional income in addition to their agricultural income.
- *Farm implements*. Tractor owner respondents were found under GO and GO+PO patterns. Plow and bullock that used to be common farm implements were no longer popularly used in the study areas. Renting a tractor has become a common occurrence. What has been increased is the water pump-set in the area where year-round irrigation is not available. However, only well-to-do farmers install this costly implement. This is why this implement was popularly found in GO+PO and GO+NGO+PO patterns where many farmers had more than 2 ha of farm land.
- *Lighting*. Kerosene and electricity were the major sources (54% and 47%) of household lighting. Except in the GO and NGO sites, electrification were completed in other sites. It is interesting to note that every respondent was not a user of electricity even in the area where electrification was completed. The respondents found electricity installation and monthly charges higher than what they can afford. So, like in non-electrified area, they preferred to use kerosene.
- *Power*. Biogas, wood, and liquefied petroleum gas (LPG) were the popular sources of household energy. Well-to-do farmers at the GO+NGO and GO+NGO+PO sites installed biogas, which is relatively a costly source. Similarly, very rich farmers who had large amount of non-farm income were using LPG. The common farmers utilize wood, which could still be gathered from nearby forest during the lenient labor time.

Table 5. Family information of farmer respondents.

FAMILY INFORMATION	CATEGORY	GO N=7	NGO N=17	PO N=5	GO+ NGO N=22	GO+ PO N=52	NGO+ PO N=14	GO+ NGO+ PO N=6	TOTAL N=123
		PERCENT							
Caste	Brahmin /Kshetry	71	29	0	32	92	21	100	60
	Baisya (Gurung/ Magar)	29	65	0	0	8	71	0	22
	Sudra (Damai/ Sarki)	0	6	0	5	0	7	0	2
	Tharu/ Darai	0	0	100	64	0	0	0	15
	Total	100	100	100	100	100	100	100	100
Family size	Small (up to 4)	0	29	0	14	10	29	33	15
	Medium (5 - 8)	57	53	20	64	58	64	17	55
	Large (9 and above)	43	18	80	23	33	7	50	29
	Total	100	100	100	100	100	100	100	100
Farm size	Marginal (0.05 - 0.5 ha)	14	47	0	45	17	29	17	27
	Small (0.5 - 2.00 ha)	57	53	40	36	62	64	33	54
	Medium (2.00 - 4.00 ha)	14	0	60	18	19	7	50	18
	Large (more than 4.00 ha)	14	0	0	0	2	0	0	2
	Total	100	100	100	100	100	100	100	100
	Mean	2	1	2	1	1	1	2	2
Tenure status	Owner cultivator	86	88	100	59	69	71	50	71
	Owner-cum-tenant	0	12	0	32	23	21	0	18
	Owner-cum-leaser	14	0	0	5	8	7	50	8
	Tenant	0	0	0	5	0	0	0	3
	Total	100	100	100	100	100	100	100	100
With additional income	% of households	71	65	80	73	44	79	83	61

Table 6. Household ownership of appliances among farmer respondents.

Appliance	Details	GO N=7	NGO N=17	PO N=5	GO+NGO N=22	GO+PO N=52	NGO+PO N=14	GO+NGO+PO N=6	TOTAL N=123
		PERCENT							
Electronics*	Radio	86	71	0	45	85	86	117	74
	Refrigerator	0	0	0	5	2	0	0	2
	TV	14	0	20	36	35	7	100	28
Transport*	Bicycle	100	35	100	95	56	50	100	66
	Motorbike	14	0	0	0	2	0	17	2
Farm implements*	Tractor	14	0	0	0	10	0	0	5
	Thresher	0	0	0	0	4	0	0	2
	Plow	0	0	40	9	0	7	0	4
	Ox	0	0	0	23	0	7	0	5
	Pumpset	14	0	0	9	38	0	83	23
Lighting	Electricity	0	0	40	68	67	50	100	54
	Kerosene	100	100	60	32	33	50	0	46
	Total	100	100	100	100	100	100	100	100
Power	Biogas	14	0	0	9	29	0	67	18
	Wood	71	100	100	82	67	100	33	78
	LPG	14	0	0	9	4	0	0	4
	Total	100	100	100	100	100	100	100	100

* Multiple responses.

Description of Research Variables: Factors Related to Effectiveness of Institutional Patterns

Table 7 depicts the personnel characteristics incentives received by extension workers, and institutional resources in terms of education, position, experience, academic background, pay, promotion, inservice training, operating budget, manpower, and materials of participating GOs, NGOs, and POs that were used in this research project.

Personnel Characteristics

- *Education*. The average number of years the agents went to a formal school for education did not differ much by pattern. The range was 10–15, 12–16, and 10–15 years for GO, NGO, and PO, respectively.
- *Position*. Twelve field workers of three agencies, four agents each, were involved in this research. The GO had three junior technicians (JT) and an officer; The NGO had three field assistants and an officer, and the PO had four proprietors.
- *Experience*. More experienced personnel were with the GO, followed by NGO and PO. The mean number of years of experience was 17.5, 2.13, and 6.75 years for GO, NGO, and PO, respectively, with corresponding ranges of 3.5-30.5, 1-3, and 1-10 years.
- *Academic background*. Agriculturists and non-agriculturists were equal in number. GO had all agriculturists; NGO, all non-agriculturists; and PO, 50 percent agriculturists and 50 percent non-agriculturists.

Table 7. Field workers' profile and institutional factors.

Factor	Description	GO N=4	NGO N=4	PO N=4	TOTAL N=12
		PERCENT			
1. Personnel characteristics					
Education	SLC (Up to 10)	25	0	50	25
No. of years in school	Intermediate (11 - 13)	25	75	0	33
	Graduate (14 and above)	50	25	50	42
	Total	100	100	100	100
	Average	13	13	13	13
	Range	10 - 15	12 - 16	10 - 15	10 - 16
Position	Field assistant	0	75	0	25
	Junior technician	75	0	0	25
	Officer	25	25	0	17

	Proprietor	0	0	100	33
	Total	100	100	100	100
Experience	Up to 3	0	100	25	42
No. of years	4 -10	25	0	75	33
	11 and above	75	0	0	25
	Total	100	100	100	100
	Average	18	2	7	9
	Range	4 - 31	1 - 3	1 -10	1 - 31
Academic	Agriculture	100	0	50	50
Discipline	Non-agriculture	0	100	50	50
	Total	100	100	100	100
1 Incentives					
Pay ('000 NRs)	Up to 50	50	50		50
	51 – 75	50	25		37
	76 and above	0	25		13
	Total	100	100		100
	Average	55	56		55
	Range	47 - 64	39 - 84		39 - 84
Promotion	No promotion	50	100	0	75
	Promotion	50	0	0	25
	Total	100	100	0	100
Training	JTA	25	0	0	8
	HM/FPR/SF	100	0	25	42
	PRA	0	100	25	42
	Ag technical	100	0	75	58
	Nontechnical		100	25	33
	Average	3	2	2	2
	Range	1 - 4	1 - 3	1 - 3	1 - 7
Total training	Up to 15	25	0	75	33
Days	16 – 30	0	50	0	17
	31 and above	75	50	25	50

	Total	100	100	100	100
	Average	54	35	21	36
	Range	5 - 102	22 - 47	5 - 57	5 - 102
3. Resources					
Operating budget ('000 NRs)	Up to 25	50	0	0	50
	26 – 50	50	0	0	50
	Total	100	0	0	100
Manpower (%)	Up to 2	25	0	50	25
	3 – 5	0	25	25	16
	6 – 10	50	50	0	34
	11 and up	25	25	25	25
	Total	100	100	100	100
Materials and supplies					
Demonstration(No.)	36	100	0	0	100
Bike (No.)	12	33	33	33	100
Motor (No.)	4	50	25	25	100

Incentives

- *Pay*. As PO personnel were proprietors themselves, they were unpaid human power. Pay did not differ greatly between GO and NGO staff in terms of field position. At the officer level, NGO staff had distinctly higher pay than GO officers.
- *Promotion*. Fifty percent of GO staff were promoted once from the position they occupied when they joined the organization. NGO staff had never been promoted. The PO personnel were all proprietors, meaning that promotion was not applicable. Since the GO staff had long years of service experience, their promotion was expected.
- *In-service training*. One GO staff underwent a junior technical assistant (JTA) training. In addition to agriculture, only 5 out of 12 field agents who received training in September 1997 on hybrid maize, farmer-preferred rice, and sunflower were found working in the research sites. All GO staff and one PO staff were found working in the research sites. None of the NGO staff who took this training were working in the field. This was because of the termination of the staff when the project was phased out. However, the project chief of RRN and two staff of LI-BIRD were working during the field research period. None of the GO staff attended the popular PRA training. All NGO staff and one PO staff had undergone this training. Agents had agricultural technical training in addition to non-

agricultural training. On average, GO staff spent a greater number of training days (53.5), followed by NGO staff (35.00) and by PO staff (20.50). The distribution of training days was more uniform in NGO and much skewed in GO. This indicates that NGO staff are given more equal chance to go to training than GO staff.

Resources

- *Operating budget*. Additional budget was not required for this project. Most of the activities implemented were part of the agencies' regular programs. However, the GO conducted two additional training under each site assigned to GO+PO and GO+NGO for which an additional budget was spent at an average of NRs 30, 000 per site.
- *Manpower*. Each agency provided manpower on a part-time basis. The percentage of the total time of agent given to this project is shown in Table 7. GO, NGO and PO have given equal time. But patternwise, the contribution of these agencies differed sharply (Appendix Table 9) with PO under GO+PO pattern contributing 30 percent of his total time for this project, followed by GO (25%) under the same pattern. The least time was given by PO under PO and GO+NGO+PO patterns.
- *Materials and supplies*. Demonstration materials, bikes and motorbikes were considered materials and supplies. Demonstration materials were provided only by GO in all GO-involved sites. Every agent had bike a but motorbike-owning agents were only 3.

Description of the Dynamics of Extending Agricultural Technologies to Farmers

Guided by the first objective of the study, this section describes the process of how the different patterns extended the selected agricultural technologies to farmers in east Chitwan, Nepal. Out of the seven patterns, three were individual patterns, each representing GO, NGO, and PO. Among the four partnership patterns, three, namely the GO+NGO, GO+PO, and NGO+PO were two-agency patterns. The remaining GO+NGO+PO pattern was the three-agency pattern of partnership. By design, the participating partner agencies allocated one or two villages comprising about 150-350 households of a village development committee (VDC) for each pattern to extend technologies related to hybrid maize, farmer-referred rice, and sunflower.

The technologies selected for this study were seed varieties, seed rate, sowing distance (sunflower), fertilizer (urea, diammonium phosphate(DAP), muriate of potash), insect control measures, disease control measures, weed control measures, irrigation, storage problems and remedies, and market information. Information about these technologies was given to agents of partner agencies in a 5-day training program in September 1997. The agents were updated with further information during monthly

meetings starting from April to December 1998. The process involved planning and implementing the following activities: agricultural input supply, output marketing, farmer motivation, farmer organizing, demonstration, farmer visit, farmers' day, leaflet distribution, training, and joint monthly meetings[5]. Among these activities, the joint monthly meeting was meant for planning and reviewing the implementation of other activities. The discussion in this section begins with this activity.

Joint Monthly Meeting

The joint monthly meeting was not initially foreseen during the formation of the project. The partner agencies felt its necessity during the April 1, 1998 meeting under the context that activities allocated to the sites of the four partnership patterns lagged far behind the activities in individual sites. The main purpose of the monthly meetings was to enhance coordination among partner agencies. The specific objectives were to (1) review the activities of the last month and (2) plan activities for the coming month. The joint meetings were also the fora for planning the next crop activities in advance and reviewing overall performance of the previous crop activities.

The partner agencies also decided to have five coordinators, one for joint meetings and four for site-specific coordination, one for each site under the partnership patterns. The monthly meetings were coordinated by an NGO (RRN).

A total of 11 joint meetings were held from April to December 1998. This number also included other meetings conducted to solve research-related problems at the project level. Altogether, 40 decisions were made. There was high level of participation by GO and NGO (Table 8). In case of POs, although they participated in the meetings, they still preferred to use the less time-taking mechanisms for information exchange. A closer look showed full (100%) participation of RRN, and 45.5 percent participation of LI-BIRD. The low participation by LI-BIRD was explained by the that their participation was not specifically important when farmer-preferred rice (FPR) was not in the discussion agenda. In some cases, however, they could not participate due to their preoccupation with their own activities. Discussions

[5] Among these activities, output marketing, postharvest, farmer’s day, record keeping and leaflet distribution are not discussed because none of the pattern performed the output marketing and postharvest activities; Only one pattern performed farmers' day, and all patterns performed pamphlet distribution and record keeping. These activities were included in table 9, while making comparison across the patterns

in the meeting were centered on research-related problems and solution seeking (Appendix Table 5).

Table 8. Participation in joint meetings by partner GOs, NGOs, and POs.

Agency	Expected attendance	Actual attendance	Actual % of attendance	Remarks[6]
GO	44	38	86.36	High
NGO	22	18	81.82	High
PO	22	11	50.00	Medium
ALL	88	67	76.14	High

The chiefs of the local units of GOs, NGOs and Pos were participated to the joint meetings. The extension officer of the DADO also participated in many joint meetings. Besides these formal meetings, there were informal meetings between the concerned partners. Telephone conversations were extensively used for interagency interactions. In the process of disseminating decisions from the meeting to the farmers, the decisions were shared in the office of the local units, which were subsequently shared with farmers either through meetings with farmer groups or directly to farmers where such groups were non-existent or nonfunctional. This process is summarized below in diagrammatic form.

[6]1-33% participation = low ; 34-67% = medium; 68-99% = high; 100% participation = full participation.

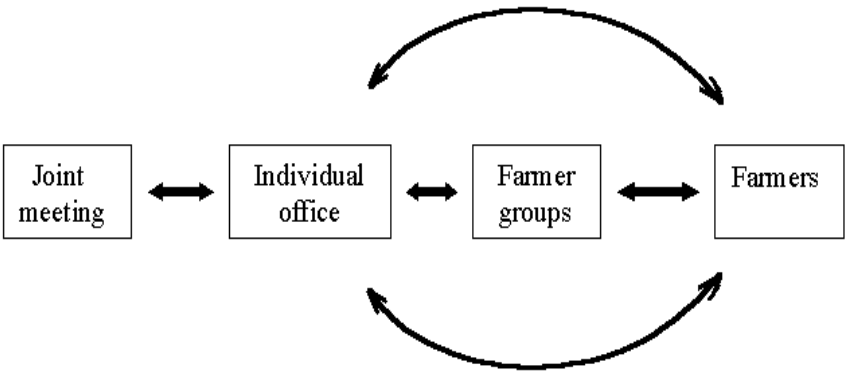


Figure 6. Dissemination process.

Institutional Extension Patterns and Performance

Government Organization (GO)

The District Agriculture Development Office (DADO) and the Agriculture Sub-Center or Agriculture Service Center (ASC) under it was the GOs in this study. The individual site delineated under this pattern was Samanpur of Kathat VDC under Khaireni ASC. The number of households in this site was 154. GO carried out the following activities through an existing farmer group composed of 13 members. The group met once a month, usually, 1 week after the joint meeting. The extension agent was found to have participated in almost all meetings. In the meeting, they discussed problems and made programs for the coming month. They also made seasonal plans. The extension agent generally guided the group. The researcher directly observed their meetings five times.

- Input supply. Seeds, fertilizers, chemicals and micronutrients were the inputs considered in this study. Fertilizer, chemicals, and micronutrients were locally available either through cooperatives or private dealers. The recommended seed variety was not locally available. PO and NGO procured seeds of sunflower from Bhairahawa, a 5-h drive from the project site, and these were made available to the GO who finally supplied the seeds to farmers. None of the farmers planted hybrid

maize and farmer-preferred rice. The reason for not planting hybrid maize, according to GO, was that this agency was not very clear about its roles and functions in the research project under study. Although two field staff from the Khaireni ASC participated in the September 1997 training course where the roles, functions, and responsibilities and implementation of this project were discussed, they were still not clear about all these. The present DADO was not also clear about the research mainly because of the transfer of the then office chief, (who signed the MOU and took part in the training program) to another district. Therefore, it could not provide any guidance to the field staff. The site was also not planted to FPR. The reason given by GO was that it did not want to ask farmers to plant new varieties unless they were tested locally. Rather, a demonstration was conducted in a farmer's field for the possible extension of this variety for the next main rice season. In the case of sunflower, the GO made 16 kg available out of the 39 kg of seed targeted to farmers through the farmer group. The extension agent gave preliminary information about SF in a farmer-group-meeting about 2 months before planting. In the following meeting, the group members decided to plant SF in a tentative area under it. Further refinement to the demand for seeds was made during successive group meetings. On this basis, the GO made the seeds available to farmers.

- *Training, meeting, and visit.* The extension agent conducted one training out of the three targeted. The eight meetings and eight visits together were all undertaken. The agent gave preliminary information to farmers about recommended technologies through farmer group meetings. After seeds were supplied, the GO provided detailed technical information about SF planting on a regular meeting day. This was followed by informal discussions in other subsequent meetings. There was a full attainment of training targets. The trainee attendance was 73 percent. On the same day the meeting was held, the agent made visits to the field.

- *Demonstration*. One demonstration (33% of target) on farmer-preferred Swarna variety of rice was conducted by the Khaireni ASC to the farmer group (FG) for possible cultivation of this variety in the next main season. The FG decided to conduct the demonstration in one of the members' plots. The variety took a little longer time to mature but was liked by many members. Its real effectiveness, however, cannot be assessed before the next main season rice planting.

- *Motivating and organizing farmers*. Seven farmers out of the 25 targeted were motivated by the GO to plant sunflower. The motivating techniques used were providing demonstration materials, intensive technical support, and participation of extension agent in the group meetings. The low number of farmers motivated was due to the fact that sunflower is a new crop in this area. Thirteen out of 25 farmers targeted were organized in a group. They were the main instruments to push extension activities in the area. This preexisting group was used to conduct

the research activities. The agent's time constraint in organizing a farmers' group was reported as the reason for the low level of organizing efforts.

Non-government Organization (NGO)

Of the two partner NGOs, LI-BIRD was given the responsibilities to act as a resource center for farmer-preferred rice technologies and to supply the necessary farmer-preferred rice seeds. This role will be described separately in another section under the research-extension linkage. The other partner NGO, the RRN, was involved in extending the selected technologies. The role of the RRN is described herein. The RRN extended the selected technologies to Simara and Nayabasti villages in Piple VDC. The technologies were extended through already existing two microcredit groups composed of 65 members together. These were women's groups. The number of households at the selected site was 287. The groups met once a week, every Thursday. The main focus of the group meeting was to collect loan payments and provide new loans. Because of the monetary transaction associated with the meeting, the RRN extension agent participated in all meetings. In the meetings, they discussed problems and made programs for the coming weeks and months. They also made seasonal plans. The extension agent generally guided the group. The researcher directly observed their meetings nine times.

- *Input supply*. Fertilizer, chemicals, and micronutrients were locally available either through cooperatives or private dealers. The recommended seed varieties were not locally available. They were procured from outside and delivered to farmers by the NGO. Hybrid maize was not planted here because of the small holding and the high cost associated with this crop. The other reason was that farmers in this area were already motivated toward practicing organic farming. The concept of organic farming did not match with hybrid maize planting, which requires high dose of chemical fertilizers. Farmer-preferred rice (FPR) was planted by eight farmers and sunflower was grown by nine farmers. In both crops, the local extension agent informed farmers two months before seed sowing about the general characteristics of the different varieties, particularly in terms of yield potential. He explained the need to determine early on the demand for each type of seeds, since they were not easily available in the market. In the subsequent meetings, the agent asked farmers to submit their demand. One month prior to sowing, the final seed demand was made. On this ground, the RRN made 13 out of 27 kg of seeds available altogether. Two things happened. In the case of rice, the RRN could not make the most preferred seed variety (PNR-381) available to farmers because LI-BIRD did not have the stock. Instead, the variety rated second (Pant-10) in preference was made available. Because of this, some of the farmers who demanded PNR-381 seeds before did not use the Pant-10 variety. That was one of the reasons for the low number of farmers adopting FPR. In the case of sunflower, the farmers who demanded seeds before hesitated to purchase seeds provided by the RRN. The

reason was that they were not sure about its performance. It was also noticed that while women demanded the seeds, the men showed reluctance to follow the females' demand. Another reason is that no demonstration was conducted. Later, the project chief convinced them about its performance. This helped, to some extent, because farmers started buying the seeds.

- *Training, meeting, and visit.* The NGO conducted two out of three targeted training, 32 meetings (100%), and 10 out of 32 targeted visits at this site. After joint decisions were made in the joint meetings, with regard to what technology to disseminate during the forthcoming months, The NGO provided economic information about the respective crop varieties during the regular meeting days. Since the field staff of RRN was a non-agriculturist by profession, he could not deal with the technical aspect. The project chief, who was an agriculture graduate, dealt with the technical aspects during the training. In two important occasions, he was not able to participate in the discussions; he, however, hired technicians from outside to lecture on the technical aspect. The farmers participating in the meetings comprised 60 percent of the 65 group members. The extension agent made few visits because he was a non-agriculturist and he thought there was very little he could contribute while visiting the field. He also mentioned that he did not get specific directions for the field visits from the project office.
- *Demonstration*. The demonstration was not conducted because it was not considered important by the NGO. The field staff had a non-agriculture academic background and did not know how to conduct demonstration. Motivating and organizing farmers. Seventeen out of the 65 targeted farmers were motivated by the NGO to plant FPR and sunflower. The motivating techniques used were informal discussions, encouragement by project chief and other project staff, visiting their houses, and listening to their other problems. The reason for the small number of farmers being motivated was that they had small farm sizes and the agent could not provide details of the recommended technology as he was a non-agriculturist. There were preexisting 65 (100%) farmers organized in two groups through which these research activities were extended.

Private Organization (PO)

Profit-making private entrepreneurs dealing with seeds, chemicals, and micro-nutrients were considered POs in this study. There were four POs involved in this study: Inter-Nepal Agrovet, Kisan Agro-Vet Sewa, Narayani Agrovet, and Beera Agrovet. The POs, unlike the GOs and NGOs, did not have field workers and field activities. They also did not have farmers' groups. They provided agricultural information to individual farmers at the time when they bought the materials from the shop. Kisan Agro-Vet Sewa extended the selected technologies to Bachhauli village in Bachhauli VDC. The household population at the selected site was 209.

- *Input supply*. Except for the recommended seeds, other inputs were locally available. The partner POs delivered these. Three farmers planted hybrid maize and two cultivated farmer-preferred rice. Sunflower was not planted here mainly because the concerned PO did not avail of the seeds. Similarly, farmers' knowledge about this crop was limited since this was a new crop in the area. The seeds purchased by the five farmers were 5 out of the 100 kg targets. The PO admitted that the recommended variety of seeds was not available on time, which might have contributed to the low availment by farmers.
- *Training, meeting, and visit*. The PO did not conduct any of the three targeted training, but 3 out of the 12 targeted informal meetings were held with farmers in Bachhauli. On average, 11 farmers attended the meetings. The PO's time constraint was the reason given for not conducting the many assigned responsibilities including training. The proprietor of Kisan Agro-vet Sewa made three visits (100%) to farmer's field. Despite being a resident of the same village, he could not make more visits because of the time limitations.
- *Farmer motivating*. The PO motivated 5 out of the 12 targeted farmers to plant HM and FPR. The motivating techniques used were informal discussion, technical information, and supply of materials. The reason for the small number of farmers being motivated, according to the concerned PO, was the shortage of time which constrained the PO to make frequent visits to farmers and conduct other extension activities.
- *Demonstration and farmer organizing*. These activities were not conducted. The main reason cited by the concerned PO was that they did not have the manpower and time to do these activities.

Partnership Pattern of GO+NGO

While preparing the MOU, the parties agreed that input supply, output marketing, and motivating and organizing farmers were the responsibilities of the NGO and that provision of technical information was the responsibility of the GO. Both of them would provide training and keep records. The site selected for this pattern was Simaltari and nearby areas in Khairahani VDC. The partner agencies were the RRN and the local ASC of DADO Chitwan. They decided to extend the selected technologies through RRN's already existing micro-credit women's groups comprising 70 members together from a household population of 271. During the joint meeting in April, the role of coordinating field activities for this site was given to RRN. As a coordinator, the NGO was the initiator of activities in many respects. Guided by the joint meeting decisions, the RRN staff and farmers discussed about the programs and problems including HM, FPR and SF during the weekly meetings. When the subject demanded discussion on the technical aspects, the RRN staff, as the coordinator, contacted GO staff (Figure 7), and the GO staff made visits and provided technical

solutions through informal discussion and/or field visit. They visited together in several occasions. The researcher directly observed these farmers' meetings nine times; four of these were participated in by the GO staff. It was observed that there was more interaction between farmers and NGO because of their frequent contact (Figure 7).

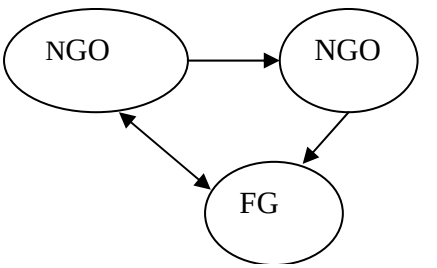


Figure 7. Dynamics between GO, NGO, and farmers' group in extension activities.

- *Input supply*. As in other patterns, fertilizer, chemicals and micronutrients were locally available either through cooperatives or private dealers. The recommended seed variety, which was not locally available, was delivered by the NGO to the farmers. Hybrid maize was planted by one farmer, whereas FPR and sunflower were planted by 6 and 15 farmers, respectively. A total of 20 kg of the seeds of the three crops were supplied by the NGO. Since majority of the farmers were small holders, they planted only on a small area of land as trial.
- *Training, meeting, and visit.* Four out of the three targeted training, 32 meetings (100%) and 16 visits (63%) were made in this pattern. After the supply of seeds, the GO and NGO agreed to hold two training for each of the FPR and SF crops. The NGO made the training programs, the GO implemented the training. The trainings were informal, conducted either at farmers' houses or in the field. All training took place during regular group meeting days, Mondays. This was followed by informal discussions in other subsequent meetings. Altogether, 32 informal discussions were held and 16 field visits were made by the NGO, which included six joint visits with the GO. An average of 67 high rate of attendance was attributed to the loans being distributed by the NGO to the group members. The GO made a few visits because of gasoline shortage.
- *Demonstration*. Seven demonstrations (100%) were held for FPR and sunflower percent of group members participated in the meetings. The crops. As per agreement, these were done by the GO.

- *Motivating and organizing farmers*. The NGO had motivated 22 of the 50 targeted farmers to plant HM, FPR, and sunflower. The motivating techniques used were informal discussions and encouragement by project chief and other project staff of NGO and GO. Also, the NGO staff frequently visited them in their houses and listened to their other problems. The low level of motivation resulted from the men not respecting the seed demand decisions made by women. Also, sunflower was new to the area and agents and farmers were inexperienced in dealing with technical factors. Technical information in this research was extended through 70 (100%) farmers organized into two preexisting groups. The agencies said that they lacked time to organize more farmers.

Partnership Pattern of GO+PO

Under this pattern of partnership, the supply of inputs and the search for a market for the produce were allocated to the PO, while motivating and organizing farmers and training them were assigned to the GO. In case of technical information, production technologies were assigned to the GO and the post harvest technologies to the PO. Record keeping was the responsibility of both GO and PO. The site selected for this pattern was Beluwa-Daduwa village and the nearby areas in Bhandara VDC. There were 311 households at this site.

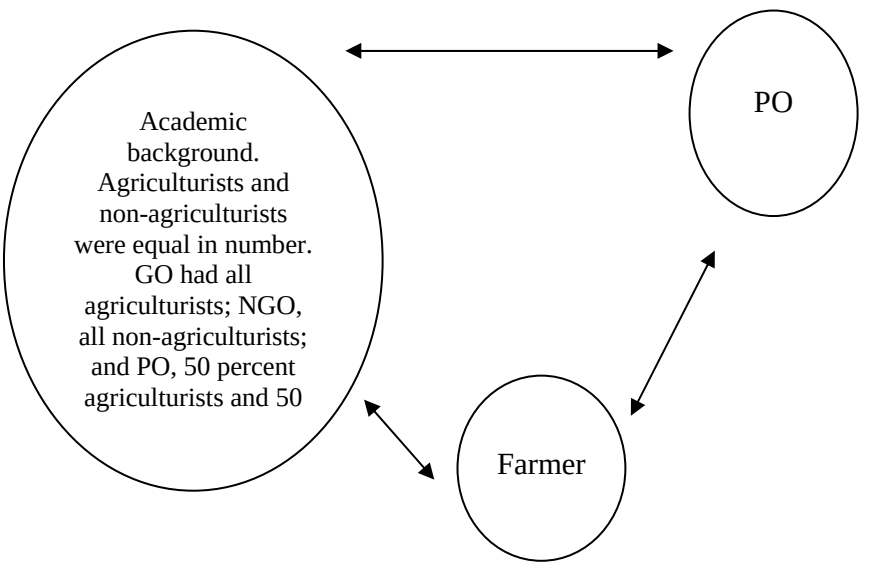


Figure 8. Dynamics between GO, PO, and farmers

Though the role of coordinating field activities was given to the GO, both GO and PO was equally active in the programs. They had direct contact with farmers as they were located near them. The Farmers came to them whenever they noticed any problem in the field. A close interaction between and among GO, PO, and farmers was observed (Figure 8). However, this kind of contact was often limited to large farm holders. The contact between these agencies and the small farmers was poor, as noted by this researcher during field visits to farmers.

- *Input supply*. As in other patterns, other inputs were locally available, but seeds were obtained from outside the village. Farmers could not avail of the seeds from the village. The local PO, Beera Agro-Vet, brought seeds and these were supplied to the farmers directly. Hybrid maize was planted by 14 farmers. Similarly, FPR and sunflower were planted by 2 and 36 farmers, respectively. Eighty-three out of 100 kg targeted seeds of the three crops was supplied by the PO.
- *Training, meeting, and visit*. The GO organized three training (100%); one was an ASC-level training about sunflower production technology. Attendance in the training was 88 percent. Shortage of time was mentioned by GO as the reason for not conducting more than the targeted number of training. No meeting was held with the farmers' group in this connection. The reason was that other farmers not belonging to the group were interested in implementing the research activities. So holding a meeting only with group members may result in a violent confrontation with non members. In the case of field visits, the GO and PO staff made 20 and 10 visits, respectively, which were more then the number targeted.
- *Demonstration and farmers' day*. The GO conducted 19 demonstrations (100%) and one farmers' day (100%).
- *Motivating and organizing farmers*. The GO and PO were able to motivate 52 out of 60 targeted farmers to plant HM, FPR, and sunflower. The motivating techniques used were informal discussions and encouragement and frequent visits of DADO and PO to this area. Although there was a group existing in the area, no group activity was done under this research project. Cases of face-to-face interaction between farmers and GO and PO by way of farmers' meetings were commonly observed.

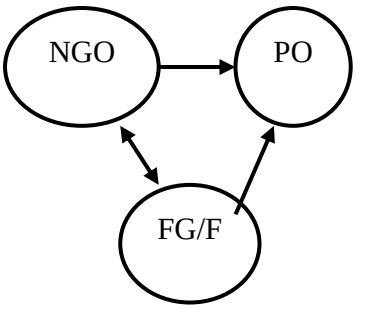


Figure 9. Dynamics between NGO, PO, and farmers in extension activities.

Partnership Pattern of NGO+PO

In this pattern of NGO+PO, the responsibilities for securing input supply and providing postharvest and marketing information were given to the PO. Farmer motivating, farmers organizing and training were assigned to the NGO. Record keeping was given to both agencies. Here, both group and non-group farmers participated. The RRN-sponsored group was very small, consisting only of 10 farmers from 198 households. The group met once a week and the researcher attended these meetings seven times. It was observed that the NGO was the key player in motivating farmers and initiating other activities (Figure 9). The motivated farmers went to the PO to get inputs. The relation of farmers with NGO was closer than that with PO probably because of the NGO's frequent visits to the area.

- *Input supply*. The recommended seeds were not locally available; the PO delivered them to the farmers. One farmer planted hybrid maize. Similarly, FPR and sunflower were planted by 1 and 12 farmers, respectively. The PO supplied 11 out of the 14 kg of seeds of the three crops. Since the varieties were new, farmers allocated only a portion of their land to avoid risk.
- *Training, meeting and visit.* One training (33%), 32 meetings (100%) and 15 (47%) visits were held during the period April–December, 1998. During the training, more non-group members were present than group members; this is because the sunflower planters did not belong to the NGO-sponsored group. These were the weekly meetings of the farmers' group. In one occasion, a special training was provided jointly by the NGO and PO. More visits were not conducted because of time constraints, according to NGO and PO staff. The field agent of the NGO, being a non-technician, made very few farm visits.

- *Demonstration*. These activities were not held for any of the crops. It was because both NGO and PO did not have any programs for demonstration. Staff of both agencies was nontechnicians and did not know how to conduct demonstration.
- *Motivating and organizing farmers*. The NGO had motivated 14 out of the 25 targeted farmers to plant HM, FPR, and SF. The motivating techniques used were informal discussion, encouragement, and the project chief's frequent visits. The field agents' lack of prior experience and their non-technical background were the reasons for poor performance as far as motivating farmers is concerned. Although there was a farmer group with 10 members, this group did not participate in the research. The role of the individual farmers was more visible. Group farmers did not like to take risks without first seeing the results of technologies in their own area. Time constraint and lack of technical staff were the reasons for not organizing more farmers.

Partnership Pattern of GO+NGO+PO

In this three-agency partnership pattern, the responsibilities for input supply and output marketing and postharvest training were assigned to the PO, while motivating and organizing farmers to the NGO. Meanwhile, production-related training was given to the GO. Record keeping was the responsibility of all three agencies. At this site, both group and non-group farmers participated in the extension project. The agencies decided to extend the selected technologies through an existing GO-sponsored group consisting of 25 farmers from 326 households. The group meets once a month and the researcher was in these meeting six times. This site was coordinated by the GO (Figure 10). The GO learned about farmers' problems, discussed them with the NGO and PO, and brought solutions back to farmers, usually in next month's meeting. There were also some NGO activities such as field visits and participation in group meetings but they were through the GO. The PO's presence was limited to the discussion with the GO and NGO. There was only one time when the PO participated in the field-level activities. The farmers did not go to the PO for seeds because it did not have the type demanded by farmers.

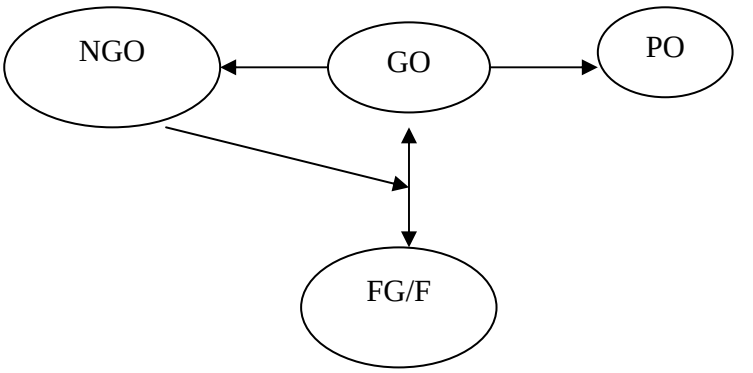


Figure 10**.** Dynamics among GO, NGO, PO, and farmers in extension activities**.**

- *Input supply*. The recommended seeds unavailable locally were procured by the NGO and delivered by the GO and NGO to the farmers. Although the responsibility of supplying seeds rests with the PO, it did not supply these seeds because of the low seed demand.
- *Farmers in this site did not plant hybrid maize*. Because this was the first crop in the research and because the researcher was not available during HM sowing, the agencies were not clear about how to conduct this project. One farmer planted FPR and 5 farmers planted sunflower. The GO and NGO supplied 5 out of the 50 kg of the targeted seeds. There were three reasons given for the low supply of seeds: first, the FPR seed variety PNR-381 was not available as per farmer's demand; second, sunflower seeds were not available at the time of planting; and third, prices for the seeds were high.
- *Training, meeting, and visit*. Two training (67%), 8 meetings (28%), and 10 visits (37%) were conducted during the period April to December 1998. The GO, NGO, and PO jointly conducted one training where 92 percent of the 25 group members participated. The GO and NGO conducted the other training. The NGO participated in the six meetings and six visits. Time constraint on the part of NGO and PO was the reason for not fulfilling the assigned responsibilities.
- *Demonstration*. There was 100% achievement as far as demonstration was concerned with the GO conducting nine demonstrations. All these demonstrations were about FPR. The GO, to whom this activity was assigned, did not have a central policy to conduct a demonstration on hybrid maize. For sunflower, a decision during a joint meeting was made not to conduct demonstration on sunflower because they had already done so in the previous planting season.

- *Motivating and organizing farmers*. The GO and NGO motivated 6 out of the 50 targeted farmers to plant FPR and sunflower. The motivating techniques used were informal discussion, training, encouragement, and participation of GO and NGO staff in farmers' meeting. Inexperience in partnership, shortage of manpower for NGO and PO, lack of policy for partnership were the reasons cited by agents for the low motivation. Altogether, 25 women out of the 50 targeted farmers were organized to implement agricultural programs. The same farmers were also the respondents in this research. In addition, farmers outside the group also participated in sunflower cultivation. The organizational efforts were hampered by time constraint of both NGO and PO, and shortage of gasoline for GO.

Analysis of the Performance of Various Institutional Patterns

Based on the previous pattern wise description, this section presents the analysis of performance. Table 9 indicates that no pattern attained full achievement of performance. However, the GO under the GO+NGO+PO pattern performed very high (93%) and high under GO+PO (80%) and GO+NGO (75%). PO performance was low under PO (32%) and GO+NGO+PO pattern (12%). The NGO showed a medium level of achievement in all partnership patterns.

The GO is the highest among the partners under partnership patterns in terms of achieving the activity target. The GO's targets such as demonstration, field visit, farmer's day that were set by the higher authority were achieved almost 100 percent. It is the general tendency within the Ministry of Agriculture (MOA) that only fixed targets are easily achieved. If any target falls short, one has to be ready with an explanation. It is because of this that numerical targets sets by the higher ups are generally fully achieved. The case was different with other GO targets such as farmer motivation, farmer organizing, market information, and postharvest information that were set locally. They were not fully achieved, a consequence, perhaps, of the centrally managed orientation of the extension staff.

Second, the level of achievement of the PO was at the lower side. The PO's mean performance was 32, 41, and 12 percent (Table 9) under PO, NGO+PO, and GO+NGO+PO pattern, respectively. Input supply, postharvest, and market information were the major tasks given to PO. The postharvest and market information was nil at all sites because the produce was consumed within the household, except for maize. For maize, the market was locally available but the prices were low. If price information from different market places were made available, farmers would have more choices for markets and may gain more profits. The PO's attempt to seek price information could not be observed during the field study period.

Table 9. Achievement of assigned responsibilities, by agencies.

Activity	Demonst	Train	Partmeet	F visit	Field day	Motivat	Organiz	Input	Record	Post-har	Market info	Overall	Rank
	PERCENT[7]												
GO+PO	100	100	0	100	100	87	50	83	100	0	0	65	1
GO	100	100	0	100	100	87	50		100			80	
PO			0	100				83	100	0	0	47	
GO+NGO	100	100	95	63		31	100	50	100	0	0	64	2
GO	100	100	75	75					100	0		75	
NGO			100	50		31	100	50	100		0	62	
NGO		67	100	31		26	100	48	100	0	0	52	3
GO	33	33	100	100		28	52	41	100	0	0	49	4
NGO+PO		33	94	43		56	40	79	100	0	0	49	4
NGO		33	100	44		56	40		100			62	
PO			33	33				79	100	0	0	41	
GO+NGO+PO	100	67	35	37		12	50	10	67	0	0	38	5
GO	100	67	100	100					100			93	
NGO			19	19		0			50			22	
PO			33	0			0	0	50	0	0	12	
PO			25	100		42		5	50	0	0	32	6
Total	90	70	57	62	100	41	58	48	89	0	0	53	

Note: Blank means not applicable; Bold means % in the pattern; No bold means % of agencies within the pattern

[7] Derived from Appendix Table 5

The most important task of the PO was to secure inputs to those who need them. Except of seeds, other inputs such as fertilizer, chemicals, and micronutrients were locally available. The PO's main task, therefore, was to make seeds available. This task involves identifying the seed source, assuring quality, procuring the required quantity, and making the seeds available to farmers at the time of need. The concerned PO, Kisan Agrovet Sewa, did not fulfill these tasks. It did not buy FPR seeds from LI-BIRD. During the researcher's informal talk with the POs, it was revealed that the PO felt it risky to buy seeds. Although, the GO and NGO gave assurance that farmers would buy the demanded seeds, the PO was not convinced. Seeds, if not sold in the appropriate season, would get reduced germination in the next season. This means that there were chances of losses, enough to make POs reluctant to procure the seed. In the case of sunflower, seeds had to be purchased from outside sources. Source identification, procurement, and availability to farmers through the respective agencies were the activities assigned to a PO (Narayani Agrovet). The PO did not make any initiative to locate the source. It was done by the NGO in consultation with the GO. Even after locating the source, the PO did not take the necessary steps to procure the seeds. The PO rather argued that it wanted to limit its participation only by providing a venue for selling seeds in the shop. Even after the other agencies have expressed willingness to purchase seeds from the PO (instead of farmers purchasing from the PO), the PO was still reluctant to procure seeds. Again, risk was the number one reason mentioned by the PO. High volume, low price, and lack of immediate payment were the other factors. The PO wanted advance payment for seed procured. Since the seeds were to be purchased by farmers, advance payment was not given, and this was why Narayani Agrovet did not procure the seeds.

RRN, the NGO, contacted Janasewa Agrovet of Khaireni to procure the seeds. This agency brought some seeds, but it was not sufficient. The proprietor indicated that he wanted to be on the safe side. Here again, the risk of unsold seeds was there. For the second lot, no PO was ready to procure the seeds which were made possible by the RRN's voluntary procurement of the needed seeds.

The GO+PO and GO+NGO patterns are better achievers compared with other patterns. The reasons for their being good achievers are given below. The following reasons were observed several times and validated during the 11th joint meeting. For the GO+PO pattern, GO and PO achieved 80 and 47 percent, respectively, with combined mean achievement of 65 percent. There was direct interaction between farmers and PO as the PO was managed by a local farmer. There was good interaction between GO and PO because both of their offices were located very close to each other.

A good working relationship was observed between them, helping each other in many respects. In two occasions, when the GO staff was out, it was observed that PO personnel gave information about the technologies. As the PO was also a farmer, he

used technologies on his own farm, and asked other farmers to use them in the forthcoming season.

In the case of the GO+NGO pattern, both GO (75%) and NGO (62%) agencies were good performers. The reasons advanced were almost the same as those in the GO+PO pattern, except that the farmers were organized in groups in this pattern. There was reinforcement of information during weekly meetings. However, the offices of these agencies were not as closely located as was the case in the GO+PO pattern. Although the GO and NGO staff were outsiders, they had good rapport with farmers. The agents had a good working relation with them.

In the case of the GO+NGO+PO pattern, although the GO was a good performer, the NGO and PO had low levels of achievement. Under this pattern, the NGO remained far behind GO, mainly because there was staff turn over because of the phase out of the project. Secondly, the coordinating role for this pattern was taken by the GO. Thirdly, the RRN did not have any prior program at this site. Also, this site was located far from the NGO project. The reasons for PO performing the least were that it had less contact with the farmers at the assigned site. The farmers, in many cases, did not get the information. Information-providing mechanisms such as training, demonstration, and farmer organization were not conducted by the PO.

Farmers' Attitude towards Extension Agents

Farmers' attitude toward extension agents was measured by 10 statements using Likert's 5-point scale, raging from strongly agree (5 points) to strongly disagree (1 point). The patterns did not differ much from each other in terms of scores (Table 10).

Table 10. Average scores for attitude of farmers toward extension agents, by patterns.

PATTERN	AVERAGE SCORE
GO	32.71
NGO	28.35
PO	29.8
GO+NGO	30.91
GO+PO	32.37
NGO+PO	30.79
GO+NGO+PO	31.83

Research - Extension Linkage

LI-BIRD was the technology resource center, specifically for rice, and RRN, DADO, and POs were the extension service providers in this study. They entered into

this research project through an MOU. According to the MOU, LI-BIRD would provide the following: (1) seeds of farmer-preferred rice varieties, (2) invitation to focus group discussion, and (3) invitation to farm-walk activities. Extension agencies, in response, would extend farmer-preferred rice technologies developed by LI-BIRD through a participatory approach. These original activities were modified on the first joint monthly meeting of April 1, 1998. In addition, representatives of research and extension agencies would meet monthly on the 5th day of each month to share technological information, promote linkage, and attain coordination. The rice varieties developed by LI-BIRD through a participatory process and preferred by farmers were used as the farmer-preferred rice in this study.

Table 11. Percentage of respondents who showed willingness to use the technologies in the future.

FUTURE USE	GO N=7	NGO N=17	PO N=5	GO+ NGO N=22	GO+PO N=52	NGO+ PO N=14	GO+NGO+PO N=6	TOTAL N=123
	P	E	R	C	E	N	T	
Will use as such	0	6	20	27	29	0	0	19
Will not	0	6	0	0	0	0	0	1
Cannot say	43	6	0	41	13	7	17	18
Will use with improvement	59	82	80	32	58	93	83	63
Total	100	100	100	100	100	100	100	100

An attempt was made to evaluate the research – extension linkage through farmers' readiness to use technologies in the future. Table 11 shows that very few persons will use technologies as recommended. Those not willing to use the recommendations were negligible. Those who still had not decided were also very few. Majority of them said that they would use these recommendations with modifications.

Summary of Dissemination Process

Individual agencies had their own technology dissemination process. The GO and NGO disseminated a given technology to groups of farmers through their field staff, whereas the PO had no field staff. POs, therefore, disseminated the technology to farmers who come to their shop to buy inputs. So, their approach was on an individual basis. Although the GO and NGO disseminated technology through farmers' groups, they differed in the frequency of contacts and categories of farmers. The GO included all categories of farmers and contacted the group once a month. The NGO, on the

contrary, formed groups of poor and small farmers and contacted the group once a week. When these agencies formed the partnership, their dissemination process changed.

The GO, NGO, PO, and resource center representatives participated in the joint monthly meetings. They reviewed the performance of the previous month and planned out programs for the next month. They disseminated the decisions in a collaborative manner. With GO+NGO partnership, the NGO motivated and organized farmers supplied the inputs and informed the GO whenever technical information were needed. The GO provided technical information, generally on the next group meeting day, through training and visit.

When the GO and PO formed the partnership, the GO motivated farmers and provided them technical information, while the PO supplied the inputs and also took part in the motivation process. Both of them went to the field together to study the problems and guide the farmers. In the case of NGO+PO partnership, the NGO motivated and mobilized the farmers, whereas the PO supplied the inputs. The GO+NGO+PO partnership, however, could not provide a clear because the NGO and PO did not fulfill the given tasks. These observations are summarized in Table 12.

Table 12. Summary of extension process, by patterns.

PATTERN	APPROACH	MEETING WITH FARMERS PER MONTH	ACTIVITIES
GO	Group	1	Demonstration, training, visits
NGO	Group	4	Informal discussion, visits
PO	Individual	0	Farmers visiting shop
GO+NGO	Group	4	Demonstration, training, visits, informal discussion
GO+PO	Group and Individual	0	Demonstration, training, visits, farmers go to shop
NGO+PO	Group and Individual	4	Informal discussion, visits, farmers go to shop
GO+NGO+PO	Group and Individual	1	Demonstration, training, visits

Effectiveness of Institutional Patterns

Effectiveness as conceived in the framework of this study is the function of knowledge, attitude, and practice (KAP) of the institutional patterns on individual farmers in relation to their adoption of recommended technologies related to HM, FPR, and SF. Table 13 presents the mean and standard deviation of each pattern. The PO turned out to be the most effective pattern, followed by GO+PO, NGO, GO+NGO, NGO+PO, GO+NGO+PO, and GO. Table 13 also shows that that PO pattern has less variability than the other patterns (except GO), as the standard deviation is smallest among the patterns.

Table 13. Mean score of farmers on knowledge, attitude, and practices, by pattern.

PATTERN	STD. DEVIATION	KAP MEAN INDEX	RANK
PO (N=5)	0.16	1.41	1
GO+PO (N=52)	0.25	1.25	2
NGO (N=17)	0.19	1.19	3
GO+NGO (N=22)	0.22	1.18	4
NGO+PO (N=14)	0.22	1.15	5
GO+NGO+PO (N=6)	0.23	1.12	6
GO (N=7)	0.12	1.10	7
TOTAL (N=123)	0.23	1.21	

The rank order using the effectiveness formula from the KAP mean index could be explained by the use of actual scores, which reflect their adoption of component technologies. The PO site had only five respondents. When their characteristics were analyzed, all of these came from the more innovative type of farmers. The respondents' characteristics such as large land size (Table 5) and level of education (Table 4) could be associated with the innovativeness of farmers. Schooling and land size are related variables (Leagans, Nd).

The large holders might have gotten the opportunity to attain higher education and they had greater access to published materials. Also, three (60 %) of the respondent farmers used hybrid technologies which were more sensitive to the recommended components of technologies, making it inevitable for them to adopt the component technologies. These may explain why farmers under PO pattern were more effective in terms of attaining higher individual KAP scores. These special characteristics, however, can be found only among a few farmers in the community; majority of farmers did not possess them. These happened to be the farmers, which most POs deal with on extension-related matters.

However, the differences between the various patterns were not great in terms of their respective capabilities to cause a change in KAP among adopter farmers. The maximum variation between two patterns was 28.18 percent. Thus, every pattern was equally capable of inducing acquisition in KAP among farmers. This implies that the various patterns had a similar impact on the individual farmers who adopted the component technologies. The percentage difference between partnership and individual patterns is less than 5 percent (Table 14). This small difference falls below the level of acceptable difference (51%) in this study. Therefore, as far as differences in effectiveness in causing a change in KAP scores by farmers are concerned, both individual and partnership patterns were the same.

Table 14. Percentage KAP mean score difference between partnership and individual patterns.

PATTERN	KAP MEAN	DIFFERENCES IN EFFECTIVENESS
Partnership	1.175	
Individual	1.233	
Difference %	4.7	No difference

Since there was no difference across IPEP and IEP, it was safe to assume that the second formula (p. 111), which measures the percentage of adoption of seed varieties across the population, becomes a valid measure of the effectiveness of the various institutional patterns in causing a change in adoption behavior. This operationalization of the measure of effectiveness is a departure from what was originally conceived in the framework (p. 38) because of the insufficient number of adopters from each site from which to draw a random sample to measure KAP means for every institutional pattern. With this as a working guideline, other measurements related to effectiveness such as identification of effective pattern as well as differentiating the contributing factors associated with the effectiveness of the various patterns made use of the data on the percentage of adoption of seed variety using the formula presented below.

Effectiveness (E) = Number of adopter households x 100

Total number of households

Thus, effectiveness in this study is measured by the extent to which farm households represented by farmer respondents adopted at least a recommended variety of rice, maize, and sunflower vis-à-vis total number of households in a given study site. The measure of effectiveness focused on the variety of seeds adopted because its adoption influenced the extent of adoption of other component technologies such as seed rate, fertilizer, plant protection practices, irrigation, and others.

Table 15. Effectiveness of institutional patterns.

PATTERN	HH POPULATIONS	NO. OF HH ADOPTERS	EFFECTIVENESS (%)	RANK
GO+PO	311	52	16.72	1
GO+NGO	271	22	8.12	2
NGO+PO	198	14	7.07	3
NGO	287	17	5.92	4
GO	154	7	4.55	5
PO	209	5	2.39	6
GO+NGO+ PO	311	6	1.84	7

Table 15 shows GO+PO as the most effective (Rank 1) among the patterns. This means that the GO+PO pattern was able to cause a change in behavior through the adoption of the recommended seed variety among 16.72 percent of the population, highest among the institutional patterns. This pattern is followed by GO+NGO, NGO+PO, NGO, GO, PO, and GO+NGO+PO, in that order.

Comparing Effectiveness between Partnership and Individual Patterns

To examine the effectiveness of partnership and individual patterns, the mean scores of the four partnership patterns were compared with the mean scores of the three individual patterns, using the percent effectiveness found in Table 15. Table 16 shows the differences in percentage effectiveness of farmer adopters by individual and partnership patterns (96.74%). This suggests that the partnership pattern of extension is more effective than the individual pattern because the partnership patterns implemented more activities than individual patterns.

Table 16. Comparative effectiveness mean scores of partnership and individual patterns

PATTERN	MEAN	DIFFERENCES IN EFFECTIVENESS
Partnership	8.44	
Individual	4.29	
Difference %	96.74	Distinctly different

The following reasons explained the differences in effectiveness between individual and partnership patterns.

The agencies that were able to fulfill more responsibilities were more effective in terms of enhancing knowledge and motivating farmers toward adopting the recommendations and making them ready to apply the technologies. Based on this relationship, the individual patterns were less effective because they implemented the assigned responsibilities at a lower rate than did partnership patterns (Table 9). The individual patterns' average performance in the achievement of assigned responsibilities was 44 percent as against 54 percent[8] of partnership patterns.

More time (10.7%) was given by the agents of partnership pattern to this project as against less time for individual patterns (5.5%) (Appendix Table 8).

There was reinforcement from peers to implement activities under IPEP. For example, the NGO reminding the GOs and POs served as an encouragement for the latter to participate in joint meetings, field visits, or preparation of technical information sheets.

The partners experienced some benefits out of the partnership. For example, with partnership, the GO was able to reach a larger number of farmers despite its fewer resources. In Khaireni, the GO would make eight visits had there not been any partnership. It conducted six visits only but it had reached an especially larger number of small farmers and had a sense of accomplishment (personal communication with DADO). Thus GO saved energy and resources as a result of the partnership. Similarly, the NGO was able to get free technical service from the GO for its clients, which otherwise, would have to be paid. Additionally, the NGO clients would be getting technical services after the NGO projects are terminated. Inasmuch as the NGO resources were dwindling as the projects were approach the phase-out stage. They were eager to find some ways of establishing client-farmer contact with a reliable permanent institution. Through the partnership, the NGO was able to obtain it. The POs were able to advertise their business and sell more while forging the partnership. It was especially observed under the GO+PO pattern. These mutually benefiting activities may have encouraged the partners to stay in partnership and to continuously provide services to farmers.

Determining the Level of Effectiveness

In an attempt to determine the effectiveness of specific pattern, the mean of all patterns was computed. A pattern falling above the mean was labeled effective, and that falling below was ineffective. Table 17 shows that the GO+PO, GO+NGO, and NGO+PO are effective patterns, while the other patterns were not.

[8] derived from Table 9.

Table 17. Identification of effective patterns.

PATTERN	EFFECTIVENESS	LEVEL OF EFFECTIVENESS
GO+PO	16.72	Effective
GO+NGO	8.12	Effective
NGO+PO	7.07	Effective
NGO	5.92	Not effective
GO	4.55	Not effective
PO	2.39	Not effective
GO+NGO+PO	1.84	Not effective
Mean	6.67	

Apart from securing a higher percentage from the implementation of the extension activities, these patterns had other additional factors that might have influenced their effectiveness. Notable among those under the GO+PO pattern were mutual understanding of each other's responsibilities, closely located offices at the research site, PO being a local entrepreneur, more frequent participation in joint meeting by both agents, and positive attitude toward each other and the partnership program. This researcher observed several instances when the PO referred farmers to the GO for proper identification of a technical problem before selling the inputs. In response, the GO after identification wrote recommendations. The farmers then went back to the PO to purchase the inputs. The researcher felt that this kind of system operating there could not be observed in other patterns.

Under the GO+NGO pattern, the offices of both agencies were not very close but within a distance of 1 km. A mutual understanding between two agencies was formed. As the NGO and the farmers met every week, the farmers would discuss their technical problems with the NGO. The NGO would in turn inform the GO about the problems. If the problem needs the involvement of the GO, then the GO would go there in the next meeting, unless it was an urgent case. In addition to the frequent contact with the NGO, there was group cohesiveness among the farmers. The leader of the group was also a member of the village council. Other group members generally accepted her ideas. She mentioned that she had a strong desire to develop her constituency, and the most appropriate way of developing her area was through agricultural development. The influence of the local leadership may have contributed to the adoption of the recommended seed variety by more farmers in this site. This site showed that even illiterate women, who are small farm size holders from the so-called slow-to-respond community, could actively participate in the technology adoption process if appropriate technology is extended through suitable mechanisms.

The NGO+PO, although with above average effectiveness, was close to the cut-off point. The reason for this pattern being effective was the greater extension contact. In one occasion, an informal training was held which was participated by the PO and the NGO chief. Farmers were eager to replace the low productive rapeseed by a new crop,

sunflower. Although this pattern was able to convince more farmers, technical points were not dealt with in detail. Under this pattern, the lack of an agricultural technician was strongly felt. The farmers were eager to plant the recommended technologies, but they lacked the needed information. The NGO staff who made weekly visits to the site was a non-technician. It was observed that they used the technologies without really understanding them. For instance, some of them broadcast the sunflower seed; some planted 2-3 seeds per hole in place of 1. When farmers asked about some technical points, the NGO agent could not answer them. One of the reasons for the low adoption of technology by farmers was that the NGO staff lacked the relevant technical knowledge, (Appendix Table 3).

Among the four ineffective patterns was the partnership pattern GO+NGO+PO along with three other individual patterns. Prior to the research, it was presumed that the GO+NGO+PO would be the most effective pattern. Unexpectedly, it came out to be the least effective. The general reason is that this pattern implemented very few extension activities that were assigned to them (Table 9). The NGO's and PO's responsibilities were not discharged. The phase out of the NGO project, reduction in manpower, no previous activities of NGO in this site, and the site being about 7 km away from the NGO office were some of the reasons given by respondents. The NGO's low involvement may have resulted in low motivation of farmers and low demand for inputs. This, in effect, may have discouraged the PO to continue its activities at this site as seed demand was low. This may be the reason why the PO did not bring the seeds as requested by the farmers. For instance, the farmers demanded rice variety seeds of PNR-381. This variety was not made available to them on time, so the farmers planted other varieties, which were readily available.

The farmers mentioned that had the PO brought the demanded variety on time, more farmers would have planted this variety. According to the PO, the quantity of seeds demanded by the farmers was low. Next, there was also a slim chance that the PO will charge more for the seed because it was to be procured from the local LI-BIRD. In addition to this low-profit business, the PO was also not sure whether farmers would buy the requested seeds. The potentially high risk and the low profit scenario might have discouraged the PO to procure FPR seeds.

The reasons for individual patterns not being effective were that they provided activities to a lesser extent (Table 9). In addition, there were also some specific reasons. The GO was clear about its activities in this project only in the later stage. Therefore, it did not make initial efforts to plant of hybrid maize. The NGO also did not like to give more emphasis on hybrid maize, considering that it was a deviation from the NGO objective of promoting sustainable development. The PO, to which the individual site was assigned, took part actively in the maize and FPR but was not active in the later stage when the time for sunflower planting came. The PO saw the possibility of incurring losses if sunflower seeds were procured by him. Also, he was

involved in some other activities, and he was putting less effort in the assigned site of this project.

Socio-Economic Dimensions of Effective Institutional Patterns

Deemed to be important but not foreseen earlier are farm size and type of technology toward which institutional patterns showed different trends. These trends are analyzed below.

Institutional Patterns and Farm Size

One of the important concerns in development discourse is reaching the disadvantaged people in society. Its implication in farming has something to do with making technologies accessible to small farmers. To evaluate which pattern served the low-income farmers, the mean farm size scores of adopter farmers were computed. The mean scores of adopter farmers showed that the NGO pattern reached small farmers, followed by GO+NGO, NGO+PO, GO, GO+PO, GO+NGO+PO, and PO. This shows that the NGO presence brings small farmers into the development arena (Table 18) The POs, on the other hand, favor the large landholders.

Table 18. Mean farm size scores of adopter farmers.

PATTERN	MEAN FARM SIZE (HA)	RANK
PO	2.40	1
GO+NGO+PO	2.02	2
GO+PO	1.23	3
GO	1.17	4
NGO+PO	1.08	5
GO+NGO	0.89	6
NGO	0.51	7

To examine whether the kinds of people served by a specific pattern differ from the rest of the farmers in farm size, a t-test was run[9] between adopter and non-adopter farmers. The t-test showed that farmers served by PO, GO+PO, GO+NGO+PO patterns differed significantly from the rest of the population at the respective sites (Table 19). For other patterns, farm size of adopter farmers was not significantly different from non-adopters. This means that farmers served by PO, GO+PO, and GO+NGO+PO patterns were large hand holders as compared with non-adopter farmers in their respective sites.

[4] The population value of farm size of the adopter farmers was compared with randomly selected sample value of non-adopter farmers.

Table 19. T-test showing differences in farm size between adopter and non-adopter farmers, by patterns

PATTERN	MEAN FARM SIZE ADOPTER	MEAN FARM SIZE NON-ADOPTER	T-VALUE
1. GO	1.17	0.69	0.1205
2. NGO	0.51	0.37	0.1852
3. PO	2.40	0.77	0.0087**
4. GO+NGO	0.89	1.04	0.6110
5. GO+PO	1.23	0.76	0.0407*
6. NGO+PO	1.08	0.58	0.0856
7. GO+NGO+PO	2.02	0.62	0.0497*
Average	1.016	0.69	

* Significant at 0.05 level. ** Significant at 0. 01 level.

Institutional Patterns and Type of Technology

A review of the kind of technologies that the patterns favor revealed that PO emphasized on high-cost technologies, whereas the NGOs went for low-cost and locally available technologies (Table 20). The GO's position regarding the type of technologies was found to be indifferent. In the GO+PO pattern, hybrid seeds were encouraged. Farmers there planted hybrid maize and sunflower extensively. Also, in the PO pattern in Bachhauli, 60 percent of the adopters used hybrid maize. It is not only the hybrid seeds which were costly, the associated technologies such as higher fertilizer requirements and more chemical sprays were costly as well. The more costly the technology is, the more profit the PO makes. The GO, in the beginning, was reluctant to support the technologies for hybrid maize and sunflower production mainly because the National Agriculture Research Council (NARC) did not recommend hybrid technologies[10]. Finally, the GO supported the hybrid technologies, specifically at the GO+PO site, possibly because of the PO influence. With GO's partnership in this endeavor, larger holder farmers, especially those under the GO+PO pattern (88%), adopted high-cost technologies.

[5] NARC is the authority for developing and recommending agricultural technologies.

Table 20. Type of technology and extension patterns

PATTERN	ADOPTER (N)	LOW TECH %	HIGH TECH %
GO	7	100	0
NGO	17	100	0
PO	5	40	60
GO+NGO	22	91	9
GO+PO	52	12	88
NGO+PO	14	86	14
GO+NGO+PO	6	83	17

The NGO, as an advocate of sustainable agriculture, favored low-cost and locally available technologies. It did not favor hybrid technologies mainly because the seeds and associated technologies were costly and the seeds had to be imported from India. At the NGO, GO+NGO, and NGO+PO sites, very few farmers were using hybrid technologies. As a summary, the PO's presence in the partnership leads the pattern to favor large farm holders and high-cost technologies, whereas the NGO's presence leads patterns to favor small farmers and low-cost technologies.

Factors contributing to the effectiveness of institutional extension pattern

Pearson's correlation coefficient was used to determine the relationship and degree of association of effectiveness of institutional patterns, the dependent variables, with personnel characteristics, personnel incentives, institutional resources, and extension activities. The results of the test are presented in Table 21. The test values are interpreted as follows:

Test value (ρ)	Qualitative interpretation
0	No linear relationship
$\pm$ 0.01 to $\pm$ 0.20	Very weak linear relationship
$\pm$ 0.21 to $\pm$ 0.40	Weak linear relationship
$\pm$ 0.41 to $\pm$ 0.60	Moderate linear relationship
$\pm$ 0.61 to $\pm$ 80.00	Strong linear relationship
$\pm$ 0.81 to $\pm$ 0.99	Very strong linear relationship
$\pm$ 1.00	Perfect linear relationship

The linear relationship below $\pm$ 0.41 is considered unimportant in this study.

Relationship between personnel characteristics and institutional effectiveness

Education, experience, and position of field workers were considered personnel characteristics in this study. Since positions differed from person to person this

variable could not be run to measure the relationship. Education was measured in terms of number of years of schooling. Education had a strong negative relationship with adoption (- 0.65) (Table 21). A separate test was run to study the relationship between education and farm visit. The test demonstrated a moderate but negative relationship (-0.56). This means that the extension agents who have higher degrees seldom visited the farmers; therefore the farmers had less chance to learn from them. A similar finding was reported by Put (1998) while comparing the performance between a GO and an NGO in Andhra Pradesh, India.

Table 21. Results of Pearson's product moment correlation coefficient for relationships of institutional factors with institutional effectiveness.

INSTITUTIONAL	CORRELATION (ρ)	LINEAR CORRELATION
Personnel characteristics		
Education	-0.65[c]	Strong negative
Experience	0.22	Weak
Personnel incentives		
Pay	-0.12	Very weak
Training	0.30	Weak
Institutional resources		
Operational budget	0.27	Weak
Manpower	0.76 [b]	Strong
Materials	0.44[c]	Moderate
Extension activities		
Demonstration	0.44 [c]	Moderate
Input delivery	0.56 [c]	Moderate
Farmer motivation	0.98 [a]	Very strong
Field visit	0.60[c]	Moderate
Farmer training	0.50[c]	Moderate
Record keeping	0.56 [c]	Moderate
Farmer organizing	0.18	Very weak
Output marketing	.	Not applicable
Farmer’s day	.	Not applicable

Experience was measured in terms of number of years served by the respondent agent in the organization on the same job. Experience had a very weak linear relationship with adoption (0.22). Due to insufficient evidence, the hypothesis that the effectiveness of institutional patterns is influenced by personnel characteristics of extension agents in terms of education and experience was rejected. This means that

the agent's higher education has a negative impact on farmer adoption if the agents do not undertake the field visit.

Relationship between personnel incentives and institutional effectiveness

Originally, pay, promotion, and training were considered personnel incentives in this study. It was revealed during the study period that PO workers do not receive salaries. Therefore, the variable pay was not run to study the relationship for the whole population. However, the relationship between pay and effectiveness was studied by analyzing four agents of GO and NGO working in non-PO sites. Pay showed a weak linear relationship with adoption (- 0.12), indicating that salary differences between staff of GO and NGO were not wide enough to bring about differences in farmers' effectiveness.

Similarly, there were some non-promotional positions. Among the promotional positions, only two were promoted (Table 7). Therefore, promotion was not run to study the relationship. In the case of training, the total number of days participated by an agent in the extension-related training courses during the last 5 years were considered. There were weak linear relationships between training and adoption (0.30). This means that the differences in effectiveness of institutional patterns were not due to differences in training days attended by the field staff.

Relationship between logistic support and institutional effectiveness

Operational budget, manpower, and materials/supplies were considered the logistic support in this study. The actual amount of budget spent by the agencies in support of this project was considered the operating budget. The operating budget demonstrated a weak relationship with effectiveness when measured in terms of adoption (0.27). Manpower was measured in terms of percentage of time spent by the agent for this research. This exhibited a strong linear relationship with effectiveness in adoption (0.76). This confirms the findings shown in Table 16: the partnership patterns which gave more time to this research were more effective than individual patterns which gave less time. Demonstration materials, motorbikes and bicycles used by agencies in this research were considered materials/supplies. They showed a moderate linear relationship with adoption (0.44). This result provided sufficient evidence that effectiveness of institutional pattern is influenced by manpower and material support. But the operational budget did not make a large difference in terms of effectiveness. This may be because the extension activities implemented at the research sites were the regular activities of these agencies. Additional budget was, therefore, not required except in two sites. In the two sites, additional budget was made available to implement activities to support this research program.

Relationship between extension activities and institutional effectiveness

Demonstration, training, field visit, farmer's day, motivation, organizing, input availability, marketing, post harvest information, and record keeping were regarded as extension activities in this study. The Pearson's product moment correlation coefficient test showed that demonstration was moderately related to adoption (0.44). This means that the pattern that conducted more demonstrations contributed more to enhancement of technical knowledge and its adoption.

Farmer training exhibited a moderate linear relationship with adoption (0.50). Field visit was moderately related to adoption (0.60). Farmer's day was conducted in only one site. Therefore, this variable was removed from the relationship analysis. Motivation showed a very strong relationship with adoption (0.98). This means that the pattern that motivated more farmers attained higher effectiveness scores.

Farmer organizing, on the other hand, had a weak relation with adoption (0.18). Input availability showed a moderate linear relationship with adoption (0.56). This means that the more farmers purchase inputs, the more they know and the more they adopt. Similarly, record keeping was also found moderately related to adoption (0.56). Agencies used these records during the joint meeting for review and planning of the activities. This might have contributed to realistic planning of programs, which helped agencies reach more farmers. Marketing and postharvest information were not indicated by any one of the patterns and these could not be run for analysis.

This analysis confirms the findings in Table 16 that the partnership patterns that implemented extension activities at a higher percentage were more effective than individual patterns that implemented them at a lower percentage. This also suggests that effectiveness in the provision of extension services, measured in terms of farmers' adoption of recommended technology, is influenced by institutional resources such as manpower and materials and extension activities such as farmer motivation, demonstration, farmer training, field visit, input availability, and record keeping.

Relationship between institutional effectiveness and fulfillment of responsibilities, participation in joint meeting, proximity of partners' residence, and distance of project site from the partner's office

Apart from the preconceived institutional variables, some new variables were captured during the field study. They included agent's participation in joint monthly meetings, residence of agent, location of partners, and fulfillment of responsibilities. Their relationship with effectiveness was evaluated using the Pearson's product moment correlation coefficient. They exhibited varying levels of relationship (Table 22). Participation in joint meetings was measured in terms of actual attendance of the agent in joint meetings. This showed a moderate linear relationship with farmer's

adoption (0.47). This means that the more number of times the extensionists attended joint meetings, the more effective they were, compared with those who attended less number of joint meetings. Participants in joint meetings got more opportunities to directly interact with other partners. Their taking part in decision-making gave them a sense of belongingness. This may have motivated them to fulfill the commitment that they made with others in the joint meetings. The residence of the extensionists had a strong linear relationship with farmers' adoption of recommended seed variety (0.71). This was measured in terms of whether the agent resided at the research site or not. The effective two patterns (GO+PO and GO+NGO) and an individual pattern (NGO) had their staff stationed in the respective research site. The agent's residence at the activity site may have some bearing on the higher effectiveness of these patterns.

Table 22. Results of Pearson's product moment correlation coefficient test for association of responsibilities, location, residence, and joint meeting with effectiveness

ACTIVITy	CORRELATION (ρ)	LINEAR RELATIONSHIP
Responsibilities	0.85[a]	Very strong
Location	0.77[b]	Strong
Residence	0.71[b]	Strong
Joint meeting	0.47[c]	Moderate

The location of the offices of partner agencies showed a strong linear relationship with farmers' adoption of technology (0.77). Location was measured in terms of whether or not the offices of partner institutions were located within a 1 km distance. In two sites, GO+PO and GO+NGO, the offices of partners were closely located. The close office located might have provided them more opportunities to interact and talk about the program which might have contributed to achieving a higher level of effectiveness.

Responsibility achievement was measured from the percentage of achievement of responsibilities of each pattern against the targeted responsibilities of the corresponding pattern. The responsibility achievement showed a very strong (0.85%) linear relationship. This confirms that the patterns that implemented the targeted responsibility at a higher percentage were able to influence more farmers to adopt the recommended seed varieties. The factors that contributed to effective institutional pattern are presented in Table 23.

Table 23. Summary results of institutional factors showing moderate to strong linear relationship with effectiveness

INSTITUTIONAL CHARACTERISTIC	CORRELATION (ρ)	LEVEL OF LINEAR RELATIONSHIP
Farmer motivation	0.98	Very strong
Responsibility	0.85	Very strong
Location of office	0.77	Strong
Manpower	0.76	Strong
Residence of extensionist	0.71	Strong
Field visit	0.60	Moderate
Input delivery	0.56	Moderate
Materials	0.50	Moderate
Farmer training	0.49	Moderate
Record-keeping	0.49	Moderate
Frequency of participation in joint meetings	0.47	Moderate
Demonstration	0.44	Moderate
Education (years of schooling)	-0.65	Strong negative

Summary of the Factors Contributing to Effectiveness of Institutional Patterns

- Farmer motivation: the higher the number of farmers motivated by the agent, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Responsibility fulfillment: the more assigned responsibilities are fulfilled by extension agents, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Location: the nearer the offices of partner agencies are to each other, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Manpower: the more time is given by an agent to extension activities, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Residence: the closer the residence of the agent to farmers, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Field visit: the higher the number of visits made by agents to farmers' field, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.

- Input availability: the more quantity of inputs are made available by agents to farmers, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Materials: the more extension materials are provided by agency to implement the extension activities, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Farmer training: the higher the number of training provided by agents to farmers, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Record keeping: the more records are kept by extension agent/agency, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Joint meeting: the higher the rate of participation of the agent in joint meetings the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Demonstration: the higher the number of demonstrations conducted by extension agent in farmers' field, the higher number of farmers who will adopt the recommended technology, hence higher effectiveness.
- Schooling: the higher the education level of agents is, the lower is the number of farmers adopting the recommended technologies, hence lower effectiveness.

Summary, conclusions, implications and recommendations

Summary

Partnership has gained popularity as a topic in development discourse these days. Governments and national and international agencies and donors emphasize the importance of collaboration between and among governmental, non-governmental, and the private sectors. However, information regarding effective partnership among these sectors is scarce. Therefore, a research undertaking that focuses on this important area is imperative.

This study has attempted to describe and analyze the effectiveness of seven extension service provision patterns. Specifically, the study tried to 1) describe the management process of three individual and four partnership patterns of GO, NGO, and PO in extending agricultural technologies to farmers in East Chitwan, Nepal; 2) identify the effective institutional patterns; and 3) identify, describe, and explain the factors contributing to their effectiveness.

The study was conducted in one each of the seven village development committees (VDCs) in East Chitwan, Nepal, with 123 farmers under rice-based farming system. RRAs and PRAs were used to select partner agencies, research sites, and technologies. Three ASCs of the District Agriculture Development Office, two NGOs, and four POs constituted the seven delivery patterns formalized through a memorandum of agreement. They assigned responsibilities and extended the recommended technologies to farmers. These seven patterns were compared in terms of effectiveness based on the percentage of farmers who adopted a recommended seed variety and the adopter farmers' knowledge of, attitude toward, and practice of recommended technologies obtained under various institutional patterns.

Information was collected through the use of an interview schedule, direct observation, tape-recorded conversation, photo documentation, account of personal experiences, and informal discussions. Field work started in April 1997 and ended in December 1998.

Data were collected in four stages. The first was the selection of partner institutions, research sites and technologies. The second, third, and fourth stages were interviews with farmers growing hybrid maize, farmer-preferred rice, and sunflower, respectively. There was a complete enumeration of the 123 adopter farmers, 12 field workers, and 5 chiefs of the offices. Additional data deemed relevant were collected from 20 randomly selected non-adopter farmers in each site to compare some socio-demographic characteristics between adopters and non-adopters.

Descriptive statistics such as means and percentage were used to describe the socio-demographic characteristics of respondents. A proportion of scores on KAP by farmers was used to analyze individual farmer's effectiveness and percentage to determine the effective institutional patterns. The Pearson's product moment correlation coefficient was used to examine the relationship between institutional variables and effectiveness.

The socio-demographic profile of the farmer respondents showed that respondents at the NGO-managed sites such as Piple and Khaireni were mostly illiterate or low literate women; in the other five sites (Bachhauli, Kathar, Birendranagar, Bhandara, and Ratnanagar), most respondents were literate men. A majority of the respondents were married. The PO and GO+NGO sites were dominated by indigenous *Tharus*; the NGO and NGO+PO sites by *Gurung/Magars* and the others by *Brahmin/Kshetry* groups. Many respondents belonged to a medium-sized family of 5-8 members, but at the PO and GO+NGO+PO sites, large families with 9 or more members predominated. Small-sized farms (0.5–2.0 ha) dominated in five sites, but at the PO and GO+NGO+PO sites, respondents had to medium-sized farms (2–4 ha). Most of the respondents were owner-cultivators (71%) at all sites. Respondents generally derived their income from farm and non-farm sources. Many respondents had radios except at the PO site where respondents had none. A very few had TV sets and refrigerators. Many respondents owned bicycles but very few had motorcycles. Very few

respondents had tractors and other farm implements. At the GO+PO and GO+NGO+PO sites, irrigation was done by using a pump set; others used the existing canal facility. The GO and NGO sites did not have electricity, hence kerosene was the main source of light. Wood was a popular source of power, followed by biogas and LPG.

Extension agents of the GO had more organizational experience than those of the PO and NGO. Mean education was almost similar among all field staff. All GO field workers had agricultural degrees; the PO had 50% of their staff as agriculturists, while the NGO field agents had no agriculture background. The GO staff attended more days of training, followed by NGO and PO staff. The POs had non-salaried staff. The salaries of GO and NGO field workers were almost similar. But the NGO officer had a higher salary than the GO officer. The PO had a non-promotional position. The NGO staff was still new in the service. The GO had 50% of its staff promoted.

The GO and NGO extended technical information through farmers' groups. The PO extended information to farmers who went to their shop to buy inputs. The groups of GO and NGO differed in the frequency of contact between extension agent and group members. The GO agents contacted the group once a month, whereas the NGO agents met them once a week.

More assigned responsibilities were attained by the GO+PO pattern. This was followed by GO+NGO, NGO, NGO+PO, GO, GO+NGO+PO, and PO. These achievements indicated the effectiveness of the institutional patterns. The most effective pattern in extending agricultural technologies to farmers was GO+PO. This was followed by GO+NGO, NGO+PO, NGO, GO, PO, and GO+NGO+PO. The Pearson’s product moment correlation coefficient revealed that assigned responsibilities such as conduct of demonstration, motivation of farmers, input availability, field visit, farmer training, and joint meeting contributed to effectiveness by showing a medium to very strong linear relationships. Two institutional variables such as manpower and extension materials were also contributing factors. Similarly, the residence of agent and location of partners were strongly related to effectiveness. Formal schooling of agent had strong negative relations with effectiveness. It was also known that educational attainment of extension agent and field visit were also negatively related. This means that extensionists with higher degree made fewer field visits, which ultimately resulted in lower effectiveness in extending agricultural technologies to farmers.

A closer look revealed that the institutional partnership pattern was more effective than the individual pattern. The two major reasons given for this success were complementary benefits derived and the role of peer pressure. However, the partnership was least effective when the concerned partners failed to fulfill the assigned responsibilities. This happened with the three-agency partnership.

Conclusions

The partnership between GO, NGO, and PO as against their individual efforts in extending agricultural technologies to farmers is more effective only when partners realize the mutually agreed responsibilities. The performance of extension patterns in realizing the agreed responsibilities and their effectiveness as measured on the basis of the percentage of farmers adopting the recommended seed variety extended by the respective patterns in this study were strongly related. The highest performing pattern, GO+PO, was also the highest in attaining effectiveness scores. This trend was true in the other patterns also. When agreed upon responsibilities were not realized by all partners, individual patterns were rather more effective than partnership patterns. Under the GO+NGO+PO pattern, although the GO performed very satisfactorily, the NGO and PO failed to perform their responsibilities. Consequently, this pattern turned out to be the least effective with farmers. Therefore, partnership between or among the committed partners is effective, not with others.

Partnership between the committed partners is effective due to their complementarity of strength. The GO's weakness in motivating farmers and the NGO's weakness with respect to technical competency were complemented by the NGO's motivating strength and the GO's technical capabilities under the GO+NGO institutional pattern. Under the GO+PO partnership, the GO's weakness in input supply was complemented by the PO and the PO's weakness in technical aspects was complemented by the GO's technical strength.

Partnership between GO+PO improves the access of large farm holders to high-cost technology. High-cost technologies give better yield than low-cost technologies. This may have motivated the large holder farmers to apply high-cost technologies. The PO, as a profit-maker, has interest in providing high-cost technologies because more profit is realized with the use of such technologies. The large holders and the Pos shared a common interest. With GO's encouragement, more farmers were motivated to apply this technology.

Small farmers, including women from the poor families, can be reached by GO+NGO partnership extension pattern. Philosophically, the NGOs are committed to the development of the disadvantaged and the poor farmers including women in sustainable agricultural technologies. The GO's agenda is also to reach the small farmers. With the NGO's strength in motivating farmers and the GO's technical competence, this partnership pattern can reach more small farmers. This partnership pattern has an advantage in reaching out to small and marginal farmers as their mandates dictate.

The exchange theory was reaffirmed. The findings corroborated the significance of the exchange theory that partner institutions continue to collaborate as long as each of them realizes benefits from that partnership. Partnership is discontinued when partners no longer get benefits from it. Among the three kinds of partners that formed a

partnership for this research, the GOs and NGOs remained stable, whereas the POs discontinued during several occasions. Only at the GO+PO site was the PO stable at all times. The reason the PO was active at the GO+PO site was that there was a greater demand for inputs in that site. This helped the PO to have a bigger volume of business and more immediate profit. At the other sites, input demand was low. The small volume of demand was not profitable to them, so they left the partnership. In the case of GOs and NGOs, their shared objectives of reaching more small farmers with better technical information were fulfilled through their partnerships. They were able to reach more farmers with less efforts and resources. Thus, this reaffirms the essence of the exchange theory that postulates that when partners continuously gain benefits (profits), remain in partnerships. Figure 11 presents the schematic diagram showing relationship between the contributing institutional factors and effectiveness in summary of these conclusions.

Implications

If only the GO+PO pattern is promoted for extension, it is likely that large holders will be benefited. Even under a government-dominated extension, where the mandate was to target the small farmers, the benefits in the past went overwhelmingly to the large farmers (Garforth and Lawrence, 1997). Under the GO+PO institutional partnership pattern, where the PO tends to favor large farm holders because of the quantity of transaction, quality, and management considerations (Sahn and Sarri, 1995), a context of large farm holders benefiting more and the small farmers being marginalized would appear. If the small farmers who constitute the majority in many developing countries are not reached, they will become even poorer. With greater access to technologies by the larger farmers at the expense of the small farmers, the rich-poor gap will be widened. This will also adversely affect the food security in every household, particularly those of marginal farmers. The global noble goal of alleviating poverty will be difficult to realize. Since the technologies to be extended are generally imported (hybrid), it will lead to a conventional kind of unsustainable development. In Nepal, where small farmers compose almost 70% of the total farm households and many areas are prone to environmental hazards (NRB, 1994), this model may not be desirable for the country. However, in areas where farmers are willing to try the highly productive technologies, the GO+PO seems to be the appropriate pattern. This setup helps countries to produce more. Without a high food production, countries cannot secure food for their growing population. If food has to be imported from other countries, the importing country will have less money left for development. This will perpetuate underdevelopment and poverty. However, given this approach, the issue on the effect of high external inputs to environmental safety remains a serious concern in sustainable agriculture development.

Improving access of small farmers to agricultural technologies is one way of ensuring food security and reducing poverty. The GO+NGO partnership seems to address this issue more appropriately as shown by this study. An active participation

of small farmers in the agriculture development process including extension acquisition, could take place with the NGO's strong social mobilization skills, closer and more equal relationship with farmers, use of strategies which are flexible and adaptive to the local situation (Torton and Farrington, 1998), and provision of opportunities for articulating needs to enhance the productivity of the poor (Clark, 1993). Secondly, the emphasis of this pattern on utilization of locally available low-cost technology helps attain sustainable development. This model seems to fit in the Nepalese socio-environmental niches. However, despite its advantages, this institutional pattern will not be able to provide service effectively to the large holders who constitute a major share in the food security process. Again, depending on the GO+NGO pattern alone, especially in countries such as Nepal whose economic base is largely agriculture, this may not be the best choice to secure the necessary food requirements of the growing population.

Therefore, partnerships are situation-specific. If situation-specific IPEP is promoted, the chances of improving access to improved technologies across different categories of farmers seem to be more achievable. Since interagency partnership is effective only between and among the committed partners and only under the partner-benefiting context, sustainable partnership will grow slowly unless interventions are made. As a new idea, interagency partnership in extension would follow the process and context of adoption of innovations. The widespread diffusion of this idea would be influenced by a combination of various factors until it is gradually adapted.

Recommendations

Since the effectiveness of interagency partnership of extension provision is situation-specific and is conditioned by the attainment of responsibilities by the institutional patterns, the following are recommended. Attention should be given to selection of partners and specifying the responsibilities. The capabilities of potential partners including their past performance should be assessed. Once the partners decide to form a partnership, the modus *operandi* should be prepared by delineating responsibilities for each partner on the basis of their strengths. Provision should be made to keep the memorandum of understanding flexible to adjust to changing situations.

A national policy that supports a multisectoral partnership in extension should be initiated and formed (Maalouf et al, 19991) by the national planning body. In the case of Nepal, the National Planning Commission should take the initiative to design a policy that favors the formation and promotion of partnership. In the formulation of the policies, representatives of GO, NGOs, POs, cooperatives, and peoples' organizations should form a taskforce to make sure that the policy promotes partnership between and among different sectors and that the partnership policy is favorable to the farmers, including small and marginal farmers and other stakeholders.

In relation to the above, local units of different sectors should be provided with the capability as well as the resources to plan and implement location-specific programs that support partnerships. While planning the extension programs, priority should be given to allocating resources to activities such as field demonstration, motivation of farmers, making inputs available, field visit, and conduct of joint meeting that were found to contribute to effectiveness of institutional patterns. Programs that create an environment which supports greater interaction between agents of partners and among agents and farmers should be created. Keeping agents in the field and putting the offices of partners close to each other would be helpful in this regard.

In addition to giving funds for the provision of extension services, donors should encourage GO, NGO, PO, and other sectors to form location-specific partnerships. The international agricultural research centers should look beyond NARS and facilitate forging such partnerships. Although these centers are making some efforts in diversifying their clientele by involving the private sector and the NGOs, they should look forward to forming multisectoral partnership. Universities and other knowledge-generating agencies should focus their attention to the conduct of research on partnership as this is a less travelled area. In developing courses on extension science, an understanding of the adaptation process with respect to why and what people do to cope with limitations in the production environment, including access to extension services, should be included.

Suggestions for Further Studies

This study focused mainly on the benefits obtained by farmers from the partnership. The benefit accruing to the institutional partners is equally important. Further studies should consider the benefits for both groups of stakeholders by using both qualitative and quantitative research methods. This study was conducted in the Chitwan District within the *tarai* context of Nepal. Further studies should be carried out under the hill context in different locations.

This study dealt with three kinds of agencies as partners in technology dissemination. Future studies may involve other agencies that deal with technology dissemination. Such agencies, among many others, may include farmers' associations, cooperatives, religious groups involved in community development, and university extension programs. In this study, there was only one site for the three-agency partnerships. The finding with respect to this pattern cannot be generalized. Secondly, there is also scarcity in literature on three-agency partnership. This calls for more studies on the three-and-more-agency partnerships. Studies with four and more agencies involved will make more cases for comparisons. Future research may be done at the same project site to evaluate the sustainability of the effective institutional collaboration pattern identified under this study.

References

Alexandratos, N. (1996). *Food, agriculture and food security: Development since the world food conference and prospects.* Technical paper: World Food Summit. November. FAO, Rome.

Arce, A, Villareal, M., De Vries, P. (1994). *The social constitution of rural development. In David Booth (ed.). Rethinking social development: theory, research and practice*. Longman Scientific and Technical, Essex, England.

Ashby, J.A., Gracia, T., Gurrero, M.P., Quiros, C.A., Roa, J.I., Beltran, J.A. (1995). Institutionalizing farmer participation in adaptive technology testing with the 'CIAL'. *Agricultural Research and Extension*. Network Paper 57. ODI, London.

Balantac, N.B. (1985). *Garlic technology utilization of farmers in Ilocos Norte*. Unpublished Ph. D. dissertation. UPLB.

Baldo, E.Y. (1994). *NGO - GO linkages in rural development in Northern Samar*. Unpublished Ph. D. Dissertation. UPLB.

Blase, M.G. (1986). *Institution building: A source book.* University of Missouri Press, Columbia.

Cardenas, V.R. (1981). *The cooptation of indigenous and recommended rice technologies among the Ilocanos*. Unpublished Ph. D. dissertation, UPLB.

Carroll, T. (1992). *Intermediary NGOs: The supporting link in grassroots development*. Kumarian Press Inc., West Hartford, Connecticut.

Center for Environmental and Agricultural Policy Research, Extension and Development. (CEAPRED). Nd. CEAPRED Brochure. Center for Environmental and Agricultural Policy Research, Extension and Development. CEAPRED, Kathamndu.

Central Bureau of Statistics (CBS). (1995). Statistical yearbook of Nepal 1995. Central Bureau of Statistics, Kathmandu.

Chanda, D. (1991). *Development through non-governmental organizations in Nepal*. Institution for National Development Research and Social Services., Kathmandu.

Clark, J. (1993). *The relationship between the state and voluntary section.*

Consultative Group on International Agricultural Research (CGIAR). (1997). CGIAR and civil society: Forging collaborative partnerships with NGOs and Farmers' organizations as a key strategy to advance sustainable agriculture in the developing world. Briefing Paper for the CGIAR System Review prepared by the CGIAR NGO Committee.

Cullin, F. (1994). *Public-private partnering. Agriculture Canada*. Internet.

De Janvry, A., SADOULET, E. (1995). Latin America beyond the debt crisis. In De Janvry et al (Eds.), State, market and civil organizations: New theories, new practices and their implications for rural development. MacMillan Press, London.

District Agriculture Development Office (DADO). (1991). "Krishi bikas karyakram ra uplabdhi: Ek jhalak 2048/049". Agriculture development program and achievement: A glimpse 1993-94. District Agriculture Development Office, Chitwan.

District Agriculture Development Office (DADO). (1996). "Krishi bikas karyakram ra uplabdhi: Ek jhalak 2052/53". Agriculture development program and achievement: A glimpse 1995-96. District Agriculture Development Office, Chitwan.

District NGO-Coordination Committee (DNCC). (1997). "Samanwaya". Coordination. A trimonthly magazine. Year 1, issue 1, January. District NGO-Coordination Committee, Chitwan.

Douthwaite, B. (1999). *Equipment evolution: Case studies of changes in rice postharvest technologies in the Philippines and Vietnam*. Unpublished PhD dissertation. University of Reading, London.

Emerson, R.M. (1976). Social exchange theory. *Annual Review of Sociology*. 2, 335 – 362.

Enos, J. L. and W. H. PARK. 1988. The adoption and diffusion of imported technology: The case of Korea.

Eponou, T. (1993). Partners in agricultural technology: Linking research and technology transfer to serve farmers. *Research Paper*, 1. ISNAR, Hague.

Eponou, T. (1996). Partners in technology generation and transfer: Linkage between research and farmers' organizations in three selected African countries. *Research Paper*, 9. ISNAR, Hague.

FAO. 2010. FAO Hunger Report 2010. FAO: Rome, Italy. http://www.fao.org/hunger/en/

Farrington, J., Bebbington, A., Wellard, K., Lewis, D.J. (1993). *Reluctant partners: Non-governmental organizations, the state and sustainable agricultural development*. Routledge, London and New York.

Food and Agriculture Organization (FAO). (1996). *World food summit: Food security situation and issues in Asia and the Pacific*. Regional Conference of Asia and the Pacific Region. May.

Garforth, C. Lawrence, A. (1997). Supporting sustainable agriculture through extension in Asia. *Natural Resource Perspective*. No. 21. http://www.oneworld.org/odi/nrp/21.html

Giddens, A. (1989). *Sociology*. Polity Press, Blackwell.

Gwin, P., Lionberger, H.F. Nd. Speeding adoption of new technology in rural America. Communication Bulletin 1-98, *Agriculture*. Extension Information. University of Missouri, Columbia.

Horton, D., Prain, G., Thiele, G. (2009). Perspective on partnership: Literature review. *Social Science Working Paper* 2009-3.

Howell, J. (1986). *Accountability on extension work. In G. E. Jones (Ed.). Investing in rural extension: Strategies and goal.* Elsevier Applied Science Publishers, London.

Hulme, D. (1994). Social development research and the third sector: NGOs as users and subjects of social inquiry. In David Booth (Ed.) *Rethinking social development: Theory, research and practice*. Longman Scientific and Technical, Essex, England.

IFAD. (1995). *Technology generation and diffusion*. Extracted from Internet. Page maintained by Roxanne Samii.

International Service for National Agricultural Research. (ISNAR). (1988). Human resource management in national agricultural research. Report of a workshop 7 – 11, November. International Service for National Agricultural Research, The Hague, Netherlands.

Jamias, A.B. (1990). *Linking inputs in the research extension linkage of a tobacco agency*. Unpublished M. S. thesis. UPLB.

Katz, S.M. (1965). *The institution building model: A system view. In (Blase 1986) Institution building : A source book*. Revised addition, 1986. Columbia: University of Missouri Press, The Hague, Netherlands.

Kerlinger, F. (1986). *Foundation of behavioral research*. Rinehart and Winston, Holt.

Khan, M., Lewis, D. J., Sabri, A., Shahabuddin, M.D. (1991). NGO interaction with the public sector: The experience of Proshika's livestock and social forestry program. Agricultural Research and Extension. *Network Paper,* 26. ODI, London.

Kumah, F.Y. (1999). *Partnership in the development process*. World Bank, Washington, D. C.

LI-BIRD. 1996. Annual report 1995-96. *Local Initiatives for Biodiversity, Research and Development* (LI-BIRD), Pokhara, Nepal.

Liegel, F.C. (1993). *Diffusion research in rural sociology: The records and prospects for the future*. Greenwood Press, Westport, Connecticut.

Lindgren H.C., Harvey, J.H. (1981). An introduction to social psychology. The C V Mosby Company, London.

Maalouf, W.D., Contado, T.E., Adhikarya, R. (1991). *Extension coverage and resource problem: The need for public-private cooperation*. FAO, Rome.

Marshall, G. (1994). *The concise oxford dictionary of sociology*. Oxford University Press, Oxford.

Ministry of Finance (MOF). 1995. *Economic survey: Fiscal year 1994/95. His Majesty's Government of Nepal* (HMG)/ MOF, Kathmandu.

Musyoka, J., Charles, R. Kaluli, J. (1991). Inter-agency collaboration in the development of agricultural technologies at national and district level in Kenya. Agricultural Research and Extension. *Network Paper 23*. ODI, London.

Navarro, R.L. (1992). *Public - private partnership in development administration: GO - NGO collaboration in agricultural development*. Unpublished Ph. D. dissertation. University of the Philippines, Diliman.

Neergaard, P., Pedersen, J.T., Jensen, E.C. (2009). Barriers and success factors in the establishment and continuous development of NGO-business partnerships in Denmark. *Working Paper* No. 02-2009. Frederiksberg, Dk: CBS Center for Corporate Social Responsibility.

Newman, W.H., Warren, E.K., McGill, A.R. (1987). *The process of management: strategy, action, results*. Prentice-Hall, Inc., New Jersey.

NGO Federation of Nepal, A brochure. NGO Federation of Nepal (NFN), Kathmandu.

NGO-federation of Nepal (NFN). Constitution of NGO-federation of Nepal 1991-92. NGO Federation of Nepal (NFN), Kathmandu.

Nugent, J.B. (1995). *Between state, market and household. In De Janvry et al (Eds.) State, market and civil organizations: New theories, new practices and their implications for rural development*. MacMillan Press, London.

Partnering and Procurement Incorporation (PPI) Nd. Public – private partnering. Internet: http://www.procurement.on.ca/ppp.html. Partnering and Procurement Incorporation, Canada.

Parveen, K. (1989). *Tomato farmers' adoption of recommended package of technology in three barangays in Calamba, Laguna. Philippines 1986 - 1988*. Unpublished Ph. D. dissertation. UPLB.

Plunkette, W.R., Attner, R.F. (1985). *Introduction to management*, Nd. Kent Publishing Co., Boston.

Put, M. (1998). *Innocent farmers: A Comparative evaluation in a government and an NGO project located in semi-arid Andra Pradesh (India) meant to induce farmers to adopt innovations for dryland agriculture*. Thela Publishers, Amsterdam.

Pyakurel, K.N. (1982). *Ethnicity and rural development: A sociological studyof four Tharu vilages in Chitwan, Nepal*. Unpublished PhD dissertation. Michigan State University, East Lansing, USA.

Rajgopalan, C., Singh, J. (1971). *Addoption of agricultural innovations*. (A sociological study of Indo - German Project Mundi). National Publishing House, Delhi.

Retty, J.N. (1995). *Regenarating agriculture: Policies and practices for sustainability and self-reliance*. Earthscan Publications, London.

Rivera, W.M. (1985). Factors for agricultural extension success: Organizational, interactive and contextual. In Rivera and S. M. Walker (Eds.), *Lifelong learning research conference proceedings* (pp 47 – 51). University of Maryland). College Park, USA.

Rivera, W.M. (1996). Agriculture extension in transition worldwide: Structural, financial and managerial strategies for improving agricultural extension. *Public Administration and Development,* 6, 868.1-11.

Rivera, W.M. (1996). *Reinventing agricultural extension: Fiscal system reform, decentralization and privatization.* Journal of International Agricultural Education. Spring.

Rocheteau, G., Bennell, P., Mclean, D., Elliott. H. (1988). *Organizational, financial and human resource issues facing West African Agricultural research system. International Service for National Agricultural Research*, The Hague, Netherlands.

Rogers, E.M. (1983). *Diffusion of innovation* (3rd ed.) The Free Press, New York.

Rogers, E.M. 1995. *Diffusion of innovation* (3rd ed.) Rev. ed of Communication of Innovations. The Free Press, New York.

Rural Reconstruction Nepal (RRN). Nd. A brochure. Rural Reconstruction Nepal, Kathmandu.

Saguibo, J.M. (1996). *Technology utilization under upland farming systems among tribal communities in Kalinga-Apayao*. Unpublished Ph. D. dissertation. UPLB.

Sahn, D.E., Sarris, A. (1995). *The political economy of economic decline and reform in Africa: The role of state, market and civil institutions. In De Janvry et al (Eds.) State, market and civil organizations: New theories, new practices and their implications for rural development.* MacMillan, London.

Scheider, B. (Ed.) (1996). Positive collaboration between NGOs and government structure. No. 27 of Newsletter. The International Communication Project, Ethopia.

Setmidjaja, D. (1990*). Adoption behavior of tea smallholder farmers in Cianjur, West Java, Indonesia.* Unpublished Ph. D. dissertation. UPLB.

Shah, A. (1995). NGO-GO interaction in watershed development: Experiences from Gujrat (India). Agricultural Research and Extension. *Network Paper* 56. ODI, London.

Sharif, M, Longmire, J., Shafique, M., Ahmad, Z. (1989). *Adoption of basmati-385: Implication for time conflicts in the rice-wheat cropping system of Pakistan's Punjab*. Ayub Agricultural Research Institute, Faisalabad, Pakistan.

Simbolan, I.D. (1992). *The adoption process of tomato production technology in Lumbang, West Java, Indonessia*. Unpublished Ph. D. dissertation. UPLB.

Singer, E.J. (1977). *Effective management coaching*. Institute of Personnel Management, London.

Social Welfare Council (SWC). (1994*). List of Non-Governmental Organizations Affiliated with Social Welfare Council*. Social Welfare Council, Lainchaur, Kathmandu.

Sollows, J., Jonjuabsong, L., Hweri-Kham, A. (1991). NGO-government interaction in rice-fish farming and other aspects of sustainable agricultural development in Thailand agricultural administration. Agricultural Research and Extension. *Network Paper* 28. ODI, London.

Steel, R.G., Torrie, J.H. (1960). *Principles and procedures of statistics. With special reference to biological sciences*. McGraw-Hill Book Company Inc., New York, Toronto, London.

Streeten , P. (1995). Market and state. In De Janvry et al (Eds.) *State, market and civil organizations: New theories, new practices and their implications for rural development*. MacMillan Press, London.

Tan, A.S. (1984). *A system approach to the analysis of functional interactions in an extension project in the Philippines.* Unpublished Ph. D. dissertation. UPLB.

Tej, K.B. (1982). *Assessment of soil test procedure for available boron and zinc in the soils of Chitwan valley, Nepal*. Unpublished Ph. D. dissertation. University of Wisconsin, Madison.

Touraine, A. (1984). The working sociological image of social life. *International Journal of Comparative Sociology*. XXV (2).

Turner, J.H. (1985). *Sociology: The science of human organization*. University of California, Nelson-Hall.

Turton, C., Farrington, J. (1998). Enhancing rural livelihoods through participatory watershed development in India. *Natural Resource Perspective*, No. 34. http://www.oneworld.org/odi/nrp/34.html

Upadhyaya, H.K. Ojha, G.P. (1992). *Trend in agricultural productivity in the Nepal tarai: A lesson from the past*. Consulatancy report submitted to the Winrock International, Kathmandu.

Uphoff, N. (1995). Grassroots organizations and NGOs in rural development: Opportunities with diminishing state and expanding markets. In De Janvry et al (Eds.), *State, market and civil organizations: New theories, new practices and their implications for rural development*. MacMillan Press, London.

Wellard, K., Farrington, J., Davies, P. (1990). The state, voluntary agencies and agricultural technology in marginal areas. *Agricultural Administration Network. Paper* 12. ODI, London.

William, C. (1991). *Non-government initiatives. the urban poor and basic infrastructure services in Asia and the Pacific*. Asian Development Bank, Manila.

World Bank. (1991. *World development report 1991: The challenge of development.* Oxford University Press, New York.

World Bank. (1997). *World development report 1997: The state in a changing world.* Oxford University Press, New York.

APPENDIX 1

1. INTERVIEW SCHEDULE (FARMERS)

Site:

Crop: Hybrid Maize/Farmer Preferred Rice/Sunflower

Name of Respondent: Date of Interview:

Time started: Time finished:

Name of Interviewer:

==========

PART I: SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Age (Last birth day): years

2. Sex : 1. Female 2. Male

3. Civil status: 1. Single 2. Married

3. Widowed 4. Separated

Caste/Ethnicity

4. Educational attainment

1. Number of years of completed schooling 2. Illiterate 3. Non-formal education literate

5. Household size

Male 14 and Above years	Female 14 and Above years	Children 14 and below years	Total

6. Educational level of Household members (Number)

Illiterate	Just literate	Below SLC	SLC and above

7. Major occupation

Farm 2. Non-farm

8. If farming

Farm size (Kattha)

Nature of ownership

1. Tenant 2. Leasee 3. Owner
4. Farm laborer 5. Others (Specify)

9. If non-farm

1. Teacher 2. Shop keeper
3. Government/non-government service holder 4. Others (please specify)

10. Source of income

1. Farm 2. Service inside village 3. Service inside outside village
4. Service out of the country 5. Pension 6. Shop 7. Others (Specify)

11. Household acquisition

A. Appliances owned (Number)

1. TV 2. Radio 3. Refrigerator 4. Others (Specify)

B. Vehicles (Number)

1. Bicycle 2. Motor cycle 3. Jeep 4. Others (specify)

C. Farm implement owned (Number)

Tractor 2. Thresher/Sheller 3. Tractor
Plow 5. Bullock 6. Others (Specify)

D. Lighting

1. Electricity 2. Kerosene 3. Biogas 4. Others (Specify)

E. Fuel

1. Biogas 2. Wood 3. Charcoal 4. Electricity 5. Others (Specify)

_____

PART II: ACCESS TO EXTENSION SERVICES

Inputs Supply

1.1. Were the following inputs available in time for hybrid maize (HM) and farmer preferred rice during the last crop season?

Input	Source	Yes	No
Seeds			
Fertilizer			
Chemicals			
Micronutrients			

1.2. To what extent were the inputs available as demanded by you?

Input	Most Adequately (4)	Adequately (3)	Inadequate (2)	Not available at all (1)
Seeds				
Fertilizer				
Chemicals				
Micronutrients				

1.3. How much of the inputs did you actually buy?

Input	Quantity purchase Kg
Seeds	
Fertilizer: 1. Urea 2. DAP 3. M/P	
Chemicals	
Micronutrients	

1.4. How much of the area did you plant/transplant with the inputs in 1.3; and what production did you get?

Crop	Area (Kattha)	Production (Quintal)	Yield t/h
Hybrid Maize			
Rice			

1.5 Were there any constraints that hampered you buying the demanded amount of inputs? Please mention constraints , if any.

Output Marketing

2.1. To what extent were you able to sell your products that you wanted? (Quantity: Kg)

Name of product	Quantity desired for sale	Actual quantity sold
Hybrid maize		
Rice		

2.2. What were the reasons for not being able to sell desired quantity, if any? Please encircle

1. No buyer 2. No good price 3. Other (specify)

2.3. Where did you sell your products?

Kind of market	sold all	Sold partial	Sold none
Local market			
Narayangarh			

2.4. Who helped you selling the products?

Helper	Adequate	Not adequate	No help
GO extension agent			
NGO extension agent			
PO extension agent			
Others			

2.5. What price did you receive? Rs per Kg

Farmer Organizing

3.1. Since when are you a member of farmer group?

1. Years for General Farmer Group 2. Years for HM/FPR/SF

3.2. Who asked you to join the farmer group? Please encircle

1. Extension agent
2. Neighbor
3. Initiated by myself
4. Other (Specify)

3.3. What are the activities you participated in since you became the member of the group?

Activity	Number of time participated
Training	
Farm visit	
Demonstration	
Meeting	
Discussion	

3.4. What are your expected outcomes as result of participating in farmer group?

Please encircle those that are applicable to you.

1. Technical farm advice
2. Strength as a group
3. Ready outlet for produce
4. Source of credit
5. Source of inputs
6. Dividend
7. None
8. Others (Specify)

3.5. If you are not a member of farming group, what are the reasons for not joining farmer group? Please encircle

1. Busy
2. Unaware of group being existed
3. No interest
4. Could not see any benefit
5. Others (Specify)

3.6. What factors motivated you to adopt the new technology? Please encircle

1. Economic benefits
2. Social benefits
3. Political benefits
4. Others (Specify)

3.7. What economic benefits did you attain? Please mention

3.8. What social benefits do you think you have gained? Please encircle

1. Prestige raised
2. More people than before visit me
3. My saying is listened more than before

3.9. What political benefits did you harvest? Please encircle

1. I got elected as an officer 2. Many people asked me to run for the officer

3. I was able to convince people to cast vote of my candidate 4. Farmer Training and Other Extension Methods

5.1. Name the kind and number of training, lecture, demonstrations and other extension activities that you attended during the last crop season? Please indicate their usefulness on the basis of three scale: Very Useful (3), Useful (2), Not Useful (1)

Name of extension activity	Number of times participated	Usefulness
Demonstration		
Training		
Farmer day		
Field visit		

5.2. Would you like to participate in similar training and extension programs in forthcoming crop?

1. Yes 2. No

Reasons:

6.1. Attitudes of farmers toward technology

Please select one option for each statement given below: Strongly agree (5), Agree (4), Undecided (3), Disagree (2), Strongly disagree (1)

1	New technologies are costly, but they give high yield. So, profit will be more while using new technologies	1	2	3	4	5
2	New tech is more fertilizer responsive, I can still use it because I can substitute synthetic fertilizer with organic fertilizer					
3	New tech are costly and are more risky					
4	New tech are not consistent with my past experience					
5	New tech demand more labor, which is one of the scarce resource in this area					
6	I found new technology giving observable high yield					
7	New tech is more complex, cannot be properly managed by me					

8	It is the high time that we use the high yield potential technologies					
9	I shall try the new technology in coming season in part of my field					
10	It is not yet time for new tech use					

6.2 Attitudes of farmers toward extension agent

1		1	2	3	4	5
2	The extension agent discusses problems with me and gives me chance to decide about technologies to be used by me					
3	The agent is very friendly to us, though he is not our relative					
4	He comes like a sales agent and advertises of the technology more than what it really is					
5	Extension agent comes rarely to this area. Although he/she comes rarely by him/ herself, when we call, comes immediately					
6	The recommendations of the agent are not appropriate to my conditions					
7	Extension agent's suggestions are mostly useful to my situation					
8	He/she comes here because s/he has to come					
	His/her suggestions are too little to solve my complex situation					
	His/her suggestions are beneficial, if we follow them properly					

Knowledge and practice of new technologies by farmers.

7.1. What are the recommended varieties of HM/FPR/SF for this area? Please tell one recommended variety of each crop

7.1.2 What varieties did you use?

7.1.3 Why did you use them?

7.2.1 What is the recommended per Kattha seed rate of HM/FPR/SF for this area?

7.2.2 What seed rate did you use ?

7.2.3 Why?

7.3.1 What is the per Kattha recommended fertilizer to this area for HM/FPR/SF?

Urea M/P DAP Others

Kg

7.3.2 What rate of fertilizer did you use for the crops given above?

Urea M/P DAP Others

Why?

7.3.3. What are the major HM/FPR/SF insect of this area?

What are the recommended control measures?

What measure did you apply?

Why?

7.3.4. What are the major diseases of HM/FPR/SF in this area?

What are the recommended control measures?

What measure did you use?

Why?

7.3.5. What are the major weeds in this area?

What are the recommended control measures?

What measure did you use?

Why?

7.3.6. What are the critical water requiring conditions of HM/FPR/SF?

In what critical conditions did you irrigate?

7.3.7. What are the major storage problems in this area on HM/FPR/SF?

What solutions are recommended?

What solutions did you use?

Why?

7.3.8. How long should HM/FPR/SF dry in sun after harvest?

How long did you dry?

Why?

7.3.9. What are the recommended selling places for your produce, if any?

Where did you sale?

Why?

Others

8.1. Did you require new skill to perform these activities? If yes, in what particular area?

8.2. How did you acquire the new skills needed?

1. Learned from extension agent
2. Learned from neighbor
3. Learned from mass media
4. Others (Specify)

8.3 What are the factors that you like the most in new technology?

1. High yield potential
2. Good eating quality
3. High price

Adaptable to local condition 5. Others (Specify)

8.4 What are the factors you dislike the most in the new technology?

1. High cost
2. Low price
3. More labor demanding
4. More fertilizer demanding
5. Complex
6. Low market value
7. Less tasty
8. Non-adaptable to local condition
9. Others (Specify)

8.5. Would you plant HM/FPR/SF using the same technology in the next respective planting season?

Would use the same?

Would modify and use?

Would not use?

8.6. What modification in new technology would you make for your next application?

Please list them out.

APPENDIX 2

INTERVIEW SCHEDULE (FIELD LEVEL PERSONNEL)

Site:

Crop: Hybrid Maize/Farmer Preferred Rice/Sunflower

Name of Respondent: Interview date

Agency: Time started

Time finished

Respondent's Profile

Position 5. Pay (include all allowances)

Appointment position NRs per year

No. of years employed in present organization

Inservice trainingEducational attainment (During last 3 years)

Times : Total days_____

JOB RELATED ASPECTS _____

1. What role have you been given by your organization to perform in this site in regard of HM/FPR/SF? Please indicate the ones that describe you.

1. Input supply
2. Output market
3. Farmer organizing
4. Farmer motivation
5. Farmer training
6. Demonstration
7. Field visit
8. Farmer day
9. Records keeping
10. Others (specify)

2. Please specify the targets given to you and their achievement

Task	Unit	Target	Achievement	Percent of achievement	Level of participation
1.Input supply 2.Output market 3.Farmer organizing 4.Farmer motivation 5.Farmer training 6.Demonstration 7.Record keeping					

8.Field visit 9.Farmer day 10.Others (Specify)					

3. What were the reasons for not achieving the target, if any?

1. Input supply 2. Output market 3. Farmer organizing
4. Farmer motivation 5. Farmer training 6. Demonstration
7. Field visit 8. Farmer day 9. Records keeping 10. Others (Specify)

4. If no target is given by your organization in extending technologies about HM/FPR/SF what activities did you perform , if any, in these regards?

Participated in monthly meeting

Encouraged farmers to use the related technologies

5. What extension approach did you apply?

1. Group approach 2. Individual approach

Describe the approach that you followed

6. What resources (manpower, money, materials) did your agency contribute to the operation of the extension program?

Manpower (no.) Money (NRs.) Materials

Time %

6.1. Did you have adequate budget to carry out the planned activities in this area for the last crop season? Please tick mark.

Very adequate (5), Adequate (4), Undecided (3),
Slightly adequate (2) and No adequate at all (1)

6.2. If poorly adequate and/or no adequate, how did you manage to carry out planned activities? Please describe.

6.3. As an extension agent, how many villages did you cover last cropping season?

6.4. How many farmers did you meet?

6.5. Were materials and supplies adequate?

Very adequate (5) Adequate (4) Undecided (3)
Less adequate (2) No supply (1)

Why did you fare differently from your counterpart in partner agencies in extending given technologies to farmers ?

7. To what extend do you think the following factors contributed in the performance of your counterparts in partner organizations in extending given technologies to farmers ? Please give them appropriate scale: Highly contributed (5), Contributed (4), No difference (3), Poorly contributed (2), Did not contribute at all (1)

SN	Factors	1	2	3	4	5
1	Degree					
2	Experience					
3	Position					
4	Pay					
5	Promotion					
6	Training					
7	Program budget					
8	No. of staff					
9	Materials/supplies					

8. Considering the incentives received by counterpart staff in other organization and considering your work performance, to what extent are you satisfied to the following incentives? Please indicate with any one of the following level of satisfaction. Highly satisfied (5), Satisfied (4), undecided (3), Poorly satisfied (2), Not satisfied at all (1)

Incentive	Level of satisfaction
Pay	
Promotion	
Training	

9. What pattern of technology transfer do you like the most? Please rank them with 1 the most important and 5 the least important scale.

Pattern of technology transfer	Ranking
1. Single organization	
2. GO + NGO	
3. GO + PO	
4. NGO + PO	
5. GO + NGO + PO	

9.1 Reasons for your liking

9.2 Reasons for your disliking

10.1. What suggestions would you like to make to your organization for continuing partnership?

1. Should be continued as such
2. Should be continued with the following modifications
3. Should be discontinued

Reasons for your suggestions

APPENDIX 3

INTERVIEW SCHEDULE (Office Chiefs)

Site: Agency:

Crop: Hybrid Maize/Farmer Preferred Rice/Sunflowe

Name of Respondent: Date of Interview Time started

Name of Interviewer Time finished

Respondent's Profile

Position 2. Appointment position

3. No. of years employed in present organization

4. Educational attainment

5. Training (During last 3 years): Times..... Days.....

==========

1. What were your perceived benefits that brought you in the partnership?

Please specify

2. What other factors motivated you to come into the partnership?

1. Conducive environment 2. Cooperative attitude of partners

3. Initiation of researcher 4. Others (Specify)

3. Do you still perceive the same benefits from the partnership?

4. How would you continue the partnership for coming crop seasons?

1. Continue the same way 2. Continue with modification

3. Discontinue

5. Reasons for your suggestions

6. What actual benefits did you receive from the partnership?

1. Economic gains (Increase in production/income) 2. Social prestige

3. Political benefits (Power/influence) 4. Sense of accomplishment

5. Others (Specify)

7. What kind of cost did you pay to harness these benefits?

8. After reviewing social, political, economic and other benefits and costs do you still intend to continue the partnership in extending technology?

Please give reasons.

9. Among different kinds of partnerships of your involvement, how would you rate them in terms of your preference? Please rank order with 1 for the most important and 5 for the least important.

Pattern of technology transfer	Ranking
1. Single organization	
2. GO + NGO	
3. GO + PO	
4. NGO + PO	
5. GO + NGO + PO	

Please provide reasons for your preference

ACRONYMS

A	Attitude
AERS	Agriculture Education and Rural Studies
Agrovet	Agriculture and Veterinary Services
ASC	Agriculture Service/Sub Center
CREMNET	Crop Resource Management Network of IRRI
DADO	District Agriculture Development Office
DAO	District Administrative Office
DAP	Diammonium Phosphate
FARMPAR	Farmer Participatory Research
FD	Farmers' Day
FG	Farmers' Group
FGD	Focused Group Discussion
FPR	Farmer Preferred Rice
FWP	Farm Walk Program
GNP	Gross National Products
GO	Government Organization
GO+NGO	Partnership Between GO and NGO
GO+NGO+PO	Partnership among GO, NGO and PO
GO+PO	Partnership Between GO and PO
HH	Household
High tech	High Cost Technologies
HMG	His Majesty's Government, Nepal
HMZ	Hybrid Maize
IAAS	Institute of Agriculture and Animal Science
IEP	Individual Extension Pattern
IPEP	Interagency Partnership Extension Patern
IRD	Informal Research and Development

JT	Junior Technician
K	Knowledge
KAP	Cumulative K, A and P
LI-BIRD	Local Initiative for Biodiversity Research and Development
Low tech	Low Cost Technologies
LPG	Liquefied Petroleum Gas
MOF	Ministry Of Finance
MOU	Memorandum of Understanding
NARC	National Agriculture Research Council
NARS	National Agriculture Research Systems
Nd	Not dated
NGO	No-Government Organization
NGO+PO	Partnership Between NGO and PO
P	Practice
PO	Private Organization
PRA	Participatory Rural Appraisal
Ref	Refrigerator
RRA	Rapid Rural Appraisal
RRN	Rural Reconstruction Nepal
SF	Sunflower
SWC	Social Welfare Council
TV	Television
VDC	Village Development Committee

Aims and Scope

SOCIAL RESEARCH REPORTS is a peer-reviewed, devoted to publishing research papers in all fields of social research. It aims to provide an international forum for the exchange of ideas and findings from researchers across different cultures and encourages research on the impact of social sciences. It also seeks to promote the transfer of knowledge between professionals in academia and practitioners by emphasizing research in which results are of interest or applicable to social practices.

SOCIAL RESEARCH REPORTS is intended to be a high quality academic journal concerning sociological research on the World. The scope of the journal is to cover social theory and analysis, social work practices.

SOCIAL RESEARCH REPORTS only publish full reports of research in social field. Each volume - usually monthly - is dedicated to only one research report, which presents detailed methodology, results and conclusions or recommendations of the study. There is no deadline for submission of manuscripts. It is a continuous process of acceptance after peer review process. Submitted research report should be on relevance to the current times and be related to themes reflecting recent and significant changes on the societies.

Abstracting information: Social Research Reports is currently noted in Index Copernicus International and on www.researchreports.ro

Guidelines for Contributors

It is a condition of publication that authors assign copyright or license the publication right in their articles, including abstract, to Expert Projects Publishing House. This enables us to ensure full copyright protection and to disseminate the article, and of course the Social Research Reports, to the widest possible readership in print and electronic formats as appropriate. Authors retain many rights under the Expert Projects rights policies. Authors are themselves responsible for obtaining permission to reproduce copyright material from other sources.

Contributions may be submitted in English, Romanian, French accompanied by abstract (max. 250 words) and keywords (max. 10) in English. Social Research Reports strongly prefers electronic submissions online. Title, authors. Name, full address and brief biographical note will be required. Referencing in the text should be as follows: (Cojocaru, 2010: 120). More detailed information about submissions can find on www.researchreports.ro