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Agricultural extension in Ethiopia: the case of participatory demonstration and training extension system

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ABSTRACT

This paper examines the participation of farmers in the Participatory Demonstration and Training Extension System and looks into the principal barriers to the adoption of modern agricultural inputs. The paper is based on a review of the literature and an analysis of data collected from 1482 household heads selected from 16 sites in four regional states, namely, the Amhara National Regional State, the Oromia National Regional State, the Southern Nations, Nationalities and People's Regional State and the Tigray National Regional State. The historical review reveals that extension programmes and policies have been formulated without due consideration to the farmers' opinion and traditional knowledge system. The various extension approaches have been biased against the livestock subsector and research and extension activities have been carried out by different organizations without proper co-ordination which, in most cases, has led to redundancy of effort and wastage of resources. Both the historical review and the survey results reveal that extension service coverage in the country has been very low, the research-extension linkage has been very poor and extension agents have been involved in different activities which are not related to their normal duties. The study also makes it clear that a host of factors, some of which are policy related, were

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responsible for the low rate of adoption of modern agricultural inputs in the country.

Introduction²

Ethiopia, with a total area of 1.1 million km², has an estimated population of 61.7 million (MEDaC 2000). Agriculture is the mainstay of the Ethiopian economy. It generates over 45 per cent of the GDP and 90 per cent of the total export earnings of the country. It is also estimated that agriculture provides employment for about 85 per cent of the labour force. The striking differences among regions in altitude, topography, soils, climate and farming systems enable the country to produce a variety of field crops, fruit and vegetables and rear different species of livestock.

However, Ethiopian agriculture is characterized by low productivity and over the last two decades it has been unable to produce sufficient quantities to feed the country's rapidly growing population. In fact, natural calamities and famine seem to have become the salient feature and permanent problem of the country. For instance, in 1973–1974 and 1984–1985 the country experienced the worst droughts in living memory that claimed the lives of several thousands of people.

One of the reasons for the existing structural food insecurity in the country is the low level of technological development, which acts as the principal barrier to the efficient utilization of the country's natural resources. Even though different extension approaches have been implemented, experiences over the past four decades have not made economists particularly sanguine with respect to bringing major impacts on the productivity of smallholders and the utilization of modern inputs. For instance, the adoption rate of modern agricultural technologies in the country is very low. On this point, MEDaC (1999) points out that the Ethiopian farmer continues to use low fertilizer rates which are estimated

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to be an average of 7 kg. of nutrients per hectare of arable land, compared with a sub Saharan average of about 9 kg. nutrients per hectare of arable land. The world average stood at 65 kg. per hectare. The physical application rates of fertilizer by most peasant farmers are well below those recommended by the extension programme (100 kg. DAP [diammonium phosphate] and 50 kg. urea per hectare) and could in some cases be as low as 20–30 kg. per hectare. Daniel et al. (1997) reported that only very few Ethiopian farmers use improved seeds: about 5–10% of total seed used for maize and even less for sorghum, barley and teff (*Eragrostis Abyssinica*). Similarly, MOA (1998a) points out that, of the 3.5 million hectares of the potentially irrigable land only 161,010 hectares (4.6%) are currently under irrigation.

A closer look at the different extension approaches reveals that they have been planned and implemented without the participation of the very people for whom they have been designed. Apart from being biased against the livestock subsector, these approaches have captured only farmers located a few kilometres from both sides of all-weather roads (Belay 1998). With the exception of a few non-governmental organizations engaged in agricultural development activities and other governmental bodies such as the Coffee and Tea Development Authority, the defunct Ministry of Natural Resources and Environmental Protection and the Ministry of State Farms' Development, which had been doing some extension work, the Ministry of Agriculture has been the sole authority responsible for the national agricultural extension system.

The objectives of this paper are: to review the different extension approaches used in the country over the past 50 years; to assess the participation of farmers in the Participatory Demonstration and Training Extension System and to identify the most important barriers to the adoption of modern agricultural inputs. The paper is organized in four sections. Section I reviews the history of extension work in Ethiopia and the different approach used so far. Section II provides a brief discussion on the method of data collection and the study areas. Section III presents the results of the study. The final section summarizes the main empirical findings and draws appropriate conclusions.

I History of extension work in Ethiopia

Agricultural extension work in Ethiopia began in 1931 with the establishment of the Ambo Agricultural School which is one of the oldest agricultural institutions in Ethiopia and the first agricultural high school offering general education with a major emphasis on agriculture. Apart from training students and demonstrating the potential effects of improved varieties and agricultural practices to the surrounding farmers, the school did not do extension work in the sense of the term that we understand today. It was with the creation of the Ministry of Agriculture in 1943 that the country witnessed the commencement of limited extension activities in different areas.³ Even then, as there was no separate division in the Ministry responsible for extension work, different services to farmers were made available by the various divisions of the Ministry. According to Haile Selassie (1959), the services rendered were more of a regulatory nature and included providing advice in soil conservation through the grow-more-trees campaign; better variety of seeds and seedlings; cleaning and seed selection; the protection of game fish; the preservation of hides and skins and so on.

However, real agricultural extension work began in the early 1950s following the establishment of the Imperial Ethiopian College of Agriculture and Mechanical Arts (IECAMA, now Alemaya University) with the assistance of the United States of America under the Point Four Programme. The academic programme of the College was modelled on the Land Grant College system with three fundamental but related responsibilities; training high level manpower; promoting agricultural research and disseminating appropriate technologies.

The role played by the IECAMA in developing the agricultural extension system is considerable. In fact, when the College was founded it was given the mandate to develop and deliver a national programme in agricultural extension. To this end, on October 1 1954, it employed two Ethiopians who had graduated from the Ambo Agricultural School

³ Up to 1943 the responsibility for agricultural matters in Ethiopia was vested in the Ministry of Commerce, Industry and Agriculture. By a law issued early in 1943, a Council of Ministers and 12 Ministries were set up. One was the Ministry of Agriculture

as extension agents. They were stationed at Assela (Arsi) and Fitcha (Shoa) to establish demonstrations with co-operative farmers. During the next few years the number of extension agents increased considerably and they were stationed at posts all around the country. According to Huffnagel (1961), from the beginning of the extension service efforts were made to obtain men who had, at least, a basic knowledge of Ethiopia's agriculture. An eighth grade education was the minimum requirement for the first selected groups of agents and trainees. From later candidates a twelfth grade education—either at Jimma or Ambo [agricultural high schools]—was demanded.

Prior to their deployment, agents were trained in various fields (such as modern techniques of crop production, modern animal husbandry practices, the operation and care of small, improved farm implements) and extension methodologies. Moreover, they took part in in-service training on a regular basis. The major extension activities were concentrated in areas where the college had experimental stations. These included the main campus at Alemaya, the central experiment station at Debre Zeit and the Jimma Agricultural and Technical School. By 1963, 77 extension posts had been established with a total of 132 nationals servicing the various areas. These agents were actively engaged in demonstrating and helping farmers use new techniques in tools and machinery, insect and disease control and improved practices in the production of livestock and crops; paying regular visits to individual farmers; organizing and holding adult educational meetings and field days and encouraging the formation of agricultural youth clubs.

In August 1963, the imperial government transferred the mandate for agricultural extension from the College to the Ministry of Agriculture, with the suggestion that the IECAMA concentrate its outreach efforts to help farmers in the vicinity of the College. Since this time the Ministry of Agriculture has been responsible for national extension activities.

Extension approaches

A review of extension activities during the last 50 years reveals that a range of extension approaches has been used. The approaches

tended differ with each successive political regime. In what follows the extension approaches used by the different political regimes are presented separately.

Under the imperial regime

Following the transfer of the responsibility for national extension administration to the Ministry of Agriculture, extension service became one of the departments in the Ministry. When the Ministry decentralized its departments by establishing provincial offices, extension provincial supervisors were appointed in all the 13 provinces of the country (with the exception of Eritrea). Each supervisor was in charge of between six and eight extension agents. The latter were located along the main roads in the country and covered an area up to 25 or 30 km from their headquarters. Stommes and Sisaye (1979) state the situation of agricultural extension in the 1960s succinctly:

Since more than 60 per cent of the peasant population live at least a half-day's walk from all-weather roads and since the few extension agents had been assigned along all major highways, there was relatively little contact between extension agents and farmers. The feudal nature of the social structure in rural areas had also limited contacts and advice of the extension agents to big landlords and influential farmers.

Up until the middle of the 1960s, policymakers paid little attention to the development of peasant agriculture. For instance, during the First Five-Year (1957–1961) and the Second Five-Year (1963–1967) development plans, despite its importance to the national economy, agriculture received only 13.7 per cent and 21.3 per cent of the total investment, respectively. Even worse, almost all the investment allotted to the agricultural sector was channelled to the expansion of large-scale commercial farms engaged in the production of cash crops for export and raw materials for local industries.

Following the increased realization of the continued stagnation of agriculture and pressure from international aid donors, it was only in its Third Five-Year development plan (1968–1973) that the government gave formal recognition to the peasant sector and made attempts to

modernize it. However, considering the fact that the country's trained manpower, material and financial resources were insufficient to modernize peasant agriculture in all areas of the country simultaneously, the government opted for the comprehensive package approach. This involved the removal of barriers to production by concentrating efforts in strategically-selected areas in which results could easily be seen.

In the Ethiopian context, the comprehensive package approach involved the co-ordinated application of different but fundamentally related strategies, such as improving the existing infrastructure, dispensing better and well organized social service and providing effective transportation, marketing and credit services, as well as popularizing appropriate, well-tested and locally-adapted improved agricultural technologies. The rationale for the comprehensive package approach was that progress made in selected sites would have multiplier effects on the surrounding areas by way of demonstration and as a result of social interaction.

The first comprehensive package project, the Chillalo Agricultural Development Unit (CADU) was established as an autonomous entity in the Arsi region south of Addis Ababa in September 1967 and was financially backed by the Swedish International Development Authority (SIDA). CADU aimed at a general socioeconomic development. Towards this end it integrated planning, credit and marketing facilities, price stabilization, mechanization, research into inputs and intermediate technologies and training local project employees. The method CADU adopted in reaching the peasants was basically that of demonstration. The project region was divided into extension areas where agricultural extension agents and model farmers demonstrated the effects of new agricultural techniques. The extension agents cultivated demonstration plots. The model farmers, selected by the peasants in the neighbourhood, were provided with fertilizers, improved seeds and improved farm implements and were instructed by the agents. Field days were held frequently on the agents' demonstration plots and on fields of the model farmers so that the rest of the peasants could then compare the yield from their own traditional methods with the yield resulting from the new techniques applied by the project.

Based on the experience gained from CADU, in the following years, other autonomous comprehensive package projects with varying objectives and approaches were initiated with the financial assistance obtained from different countries. These included the Welamo Agricultural Development Unit; the Ada District Development Project; the Tach Adiabo; and Hedekti Agricultural Development Unit in the northwest of Tigray; the Southern Region Agricultural Development Project in the vicinity of Awassa town; and the Humera Agricultural Development. However, it was only CADU that was fully operational until it was phased out in 1986.

It was soon realized that the comprehensive package projects failed to serve the very people for whom they were destined, the tenants and small-scale farmers. Most importantly, the principal beneficiaries were landlords and commercial farmers who reaped almost all the services rendered. In evaluating the experience from CADU, Schulz (1981), underlined the fact that the distribution of CADU loans between tenants and landowners has always been biased in favour of owners and so, proportionately, there have been roughly only half as many tenants on the credit list as there are in the target population. Other authors have shown that, by encouraging the process of mechanization in larger commercial farms, the package projects accelerated the eviction of tenants (Betru 1975, EPID 1970, Mengisteab 1990, Task Force on Agricultural Extension 1994a, Tesfai 1975).

It also became apparent that the comprehensive package projects were too expensive, both financially and in terms of trained manpower requirements, to warrant replication in other areas of the country. As a result, in 1971 the government, in co-operation with SIDA, designed an alternative strategy envisaged to be compatible with the availability of resources called the Minimum Package Project I (MPP-I). MPP-I was prepared for the 1971–1974 period and was designed to provide small-scale farmers with services considered to be the minimum essential elements for agricultural development (Mengisteab 1990, Schulz 1981). These included agricultural credit, marketing and extension advice, including the dissemination of innovations such as fertilizers and high-yielding hybrid seeds.

It was also in 1971 that the government established the Extension and Project Implementation Department (EPID) in the Ministry of Agriculture. EPID was commissioned to administer the minimum package projects and supervise the activities of comprehensive package projects. The MPP-I was supposed to reach a large number of farmers by making use of the technologies generated and tested by the comprehensive package projects. As to its method of technology transfer, it employed an individual farmer extension approach, where both model farmers and extension agents demonstrated the importance of improved techniques of production. An extension agent under MPP-I was expected to cover an extension area of about 10 to 15 km along an all-weather road and about 3 to 5 km (but sometimes up to 10 km) on both sides of the road. Each extension area had a marketing centre and a crop demonstration plot and agents sold fertilizer and seeds on credit. Five extension areas constitute a full-fledged MPP area. Each MPP area, which extends over 75 km, was designed to serve about 10,000 farm families.

Though EPID was able to provide agricultural services in 280 of the 580 districts and some improvements were made in terms of the adoption of improved inputs, MPP-I failed to have a significant impact on the agricultural sector because the government was reluctant to put in place the necessary reform measures in the areas of land tenure, tenant-landlord relationships and the organizational and administrative systems of the different institutions entrusted with agricultural development of the country (Harbeson 1990, Mengisteab 1990, Schulz 1981). For instance, the quality and extent of research work aimed at developing technological packages adapted to the different ecological zones of the country fell below expectations. Moreover, as extension activities were concentrated in areas where mixed farming system prevails, MPP-I made a very marginal contribution to those farmers in the lowland areas engaged in animal production. Tesfai (1975) points out that, just as in the case of comprehensive package projects, the principal beneficiaries of the MPP-I were wealthy farmers who had access to modern inputs.

Under the military regime

Following the 1974 revolution, the new military regime enforced land reform on 4 March 1975. The land reform proclamation banned the private ownership of rural lands and declared that land would be distributed to the tillers without compensation to former owners. It also limited the size of land to be allotted to any single family to a maximum of 10 hectares. Moreover, it prohibited the transfer of land by sale, exchange, succession, mortgage, lease or other means. Chapter 3 of the proclamation contains provisions for the establishment of peasant associations, the basic instrument for implementing the land reform. The Peasant Association is a territorial organization encompassing 800 hectares or more. The average Peasant Association membership is 250–270 families (households).

It was planned that, at the end of the MPP-I period, MPP-II would be undertaken over the 1975/76–1979/80 period. However, because of the political instability and major structural changes in the rural areas, including the formation of peasant associations and producers' co-operatives as well as the implementation of the land reform, it was not possible to carry out this plan. There was not much organized and coordinated extension work in the country, therefore, until the beginning of the 1980s and it was only in 1981 that MPP-II was started.

MPP-II had the same objectives as MPP-I. However, MPP-II was envisaged to cover 440 of the total 580 districts and reach as many farmers as possible. One major difference between the two was the channel employed in the transfer of technology. Under MPP-II the peasant associations and co-operatives were used as the focal points through which improved inputs, techniques of production and advice were channelled to the member farmers.

As EPID was dissolved following the reorganization of the Ministry of Agriculture in 1979, the extension service, formerly under one umbrella, was split up and its activities were taken over by the line departments of the Ministry. The principal extension activities carried out by the different departments of the Ministry during MPP-II were in soil and water conservation, crop production and protection, livestock and fisheries and forestry. Given the fact that the extension services had been

disintegrated, different extension agents representing the interests of the different departments could approach one and the same farmer, leading to the duplication of efforts and at times misuse of the limited available resources.

MPP-II was assisted by the World Bank, the International Fund for Agricultural Development (IFAD) and, to a small extent, by SIDA. During its implementation (1981–1985), the MPP-II did not attain its stated objectives because the very limited number of extension agents available in the country were made to cover as wide an area as possible without adequate facilities and logistical support. The same agents were overloaded with different assignments, such as collecting taxes, promoting producers' co-operatives, collecting loan repayments and mobilizing labour and resources on the part of public authorities, which were, at times, not in their domain of responsibility (Task Force on Agricultural Extension 1994a).

The poor research–extension linkage was another factor responsible for the mediocre performance of the extension service of MPP-II. Most importantly, the country did not have the capacity and resources to develop innovations suitable to its socially and ecologically varied regions. Moreover, as compared to the MPP-I, in the course of implementing MPP-II the Ministry was compelled to work under a very limited budget.

The MPP-II was phased out in 1985 and replaced by another strategy called the Peasant Agriculture Development Extension Programme (PADEP). PADEP was designed to bring perceptible changes in peasant agriculture through concerted and co-ordinated efforts in the areas of agricultural research and extension. The strategy was based on a critical evaluation of past extension strategies and underscored the importance of stratifying the country into relatively homogeneous zones, decentralizing the planning and execution of agricultural development activities and empowering and giving considerable attention to zones which were to be the centres of development efforts. Accordingly, on the basis of resemblances in climatic conditions, cropping patterns, natural resource endowments and geographical proximity, the country was divided into eight agricultural development zones.

The programme had different objectives for the different agricultural development zones. However, the principal ones were: increasing food production at least to the level of self-sufficiency; developing the production of cash crops for export and raw materials for domestic industries; increasing rural sector employment opportunities; supporting and encouraging the development of rural co-operatives; preventing further soil depletion and introducing suitable farming system in erosion-prone areas of the country.

It was initially planned to concentrate the programme on high potential areas so as to raise their production and productivity by channelling the limited resources and extension services towards them. To this end, 148 surplus-producing districts were selected out of the total 580. PADEP employed a modified Training and Visit (T & V) extension system. In the selected districts an extension agent was assigned to serve 1300 peasant households through contact farmers organized into groups (the conventional T & V system recommends one extension agent for 800 farmers) and 2500 farmers in all other areas (non-surplus producing areas). Moreover, extension agents were trained monthly instead of fortnightly and zonal subject matter specialists were trained quarterly instead of monthly, as proposed by the conventional T & V system. In each district there was one extension co-ordinator for 10 extension agents and the co-ordinator visited the agents once a week. Each extension agent worked with 48 contact farmers. The agent made regular visits of four days a week and on each day six contact farmers, who had each 26 follower farmers, were visited for a period of 30 minutes each. Each contact farmer was therefore visited twice a month.

As the poor research-extension linkage was considered to be an essential factor affecting the efficiency of extension work, Research Extension Liaison Committees were formed in 1986 both at the national and zonal levels. The committees were established to serve as a formal linking mechanism between research and extension and were mandated to review and approve research proposals submitted by research institutes. They were also to serve as a forum where the views of extension workers were taken into account in identifying research problems for the formulation of research topics.

This was thought to help ensure that both researchers and development agents address the real problems that farmers face. However, the committees did not live long enough to be of practical use for two reasons. On one hand, some of the newly-created agricultural zones had no research stations and, on the other, the committees had no budget and were not backed up by the public authorities concerned. The activities of the committees were interrupted in 1991 because of the change in government, which resulted in the dissolution of the zonal agricultural offices and the transfer of their roles to the new Regional Bureaux of Agriculture.

Like many of its predecessors, PADEP was designed as a foreign-aided project (the principal donors for the PADEP were the European Economic Commission, IFAD, Italy, African Development Bank, Sweden and the World Bank). Consequently, its implementation had to be postponed pending the government's compliance with the conditions laid down by donor organizations. More specifically, donor countries and organizations had been pressing the government to abandon its agricultural policy, which was biased in favour of state and collective farms, to liberalize agricultural marketing and to give considerable emphasis to small-scale farmers.

It was only in 1989 that PADEP could effectively be started. Even then, only six out of the eight PADEP programmes secured funding from both donors and government and were in operation. Even in areas where extension activities were undertaken it was not possible to bring together farmers and extension workers. Extension messages were not entirely devoid of political objectives and agents were seen by the farmers as government spokesmen rather than development workers.

On all counts the extension approach was defective, not only because it was not participatory, but also because of its inflexible and top-down nature (Befekadu and Berhanu 1999–2000). The principal factor responsible for the inefficiency of extension work during 1975–1991 was the government's agricultural policy, which favoured the development of state and collective farms. Although the 1975 radical land reform put an end to the tumultuous tenant–landlord relationships, the collectivization and villagization policies pursued by the Marxist

government and its commitment to increasing public ownership contributed greatly to the low performance of the agricultural sector in the 1980s.

A number of empirical studies on the Marxist government's agricultural development strategy concluded that the state and collective farms, which accounted for less than 10 per cent of the total cultivated area, received the lion's share of subsidized agricultural inputs (agricultural credit, fertilizers, improved seeds and so on), extension services, farmers' training and the government's investment in agriculture, to the detriment of the private farms, which accounted for more than 90 per cent of the total agricultural production (Clapham 1987, Cohen and Isaksson 1988, Mengisteab 1990, Pickett 1991). Paradoxically, state and collective farms have proved disappointing in terms of productivity, employment creation and environmental protection (Cohen and Isaksson 1988, Mengisteab 1990). In general, in the 1980s extension activities were obstructed by the government's selective agricultural policy and 'the non-surplus producing regions' had not received enough attention.

The current situation

- Following the change in government in 1991, the T & V extension approach was adopted as a national extension system with major government financing until its replacement by the Participatory

⁴ With the change in government in 1991, the country was divided into nine administrative regions, a federal capital (Addis Ababa) and one special administrative division (Dire Dawa). At present, extension activities are the entire responsibility of regional agricultural bureaux. The extension division of the federal Ministry of Agriculture has the task of co-ordinating inter-regional extension work, providing policy advice on nationwide agricultural extension issues, advising regional bureaux of agriculture in the areas of extension management and administration, developing extension training materials and organizing training programmes in agricultural extension for regional extension personnel. The regions are given full autonomy in the planning, execution, monitoring and evaluation of extension programmes

Demonstration and Training Extension System in 1995.⁴ The latter was adopted from the Sasakawa Global 2000 (SG 2000) extension strategy, initiated in Ethiopia in 1993 by the Sasakawa Africa Association and Global 2000 of the Carter Centre. As clearly indicated by Quinones and Takele (1996), the SG 2000 extension programme had the following objectives:

- to assist Ethiopia's efforts to increase agricultural production through an aggressive technology transfer programme that disseminated improved production technologies to small-scale farmers through the extension service of the Ministry of Agriculture;
- to strengthen the capacity of extension services for the expedient dissemination of proven, research-led technologies to small-scale producers, particularly in food crops;
- to invigorate the linkages between research and extension in order to streamline the process of technology generation and dissemination and to provide appropriate feedback to research for technological interventions when necessary and
- to extend, through extension services, improved grain storage and preservation technologies as well as agro-processing techniques suitable for small-scale producers.

According to Takele (1997), the centrepiece of the SG 2000 technology transfer method is the extension management training plot (EMTP). EMTPs are on-farm technology demonstration plots established and managed by participating farmers who are selected by the local extension workers and SG 2000 personnel. The extension agents play a facilitating role in the management of the plots. The agents also use the EMTPs to train both participating and neighbouring farmers so that they can put into practice the entire package of recommended practices. The size of each EMTP is usually half a hectare and adjacent farmers can pool their plots to form an EMTP if they cannot meet the half-hectare requirement individually.

The SG 2000 extension activities started by assessing available agricultural technologies in the country with the support of the national research and extension bodies. On the basis of the availability of

improved varieties and recommendations of the research and extension experts, in 1993 technology packages for maize and wheat production were defined and demonstrated to 160 farmers residing in seven districts of the Oromia National Regional State and the Southern Nations, Nationalities and Peoples Regional State. In 1994 the SG 2000 extension programme expanded its extension activities both in terms of area coverage and technology packages. More specifically, sorghum and teff technology packages were included in the programme, the number of participating farmers rose to 1600 and the programme was expanded to some districts of the Amhara National Regional State and the Tigray National Regional State.

In 1995 good weather conditions, coupled with the material and technical support that participating farmers received from SG 2000, resulted in substantial yield increments. The impressive yield increments obtained by the participating farmers persuaded the Ethiopian government that self-sufficiency in food production could be achieved by adopting the SG 2000 extension approach. Consequently, in 1995 the government took the initiative to run the programme on its own and launched the participatory demonstration and training extension system (PADETES) as the national agricultural extension system.

PADETES was developed after a critical evaluation of the past extension approaches and the experience of SG 2000. Its major objectives include increasing production and productivity of small-scale farmers through research-generated information and technologies; empowering farmers to participate actively in the development process; increasing the level of food self-sufficiency; increasing the supply of industrial and export crops and ensuring the rehabilitation and conservation of the natural resource base of the country (Task Force on Agricultural Extension, 1994b).⁵

The system gives special consideration to the package approach to agricultural development. Initially, PADETES promoted cereal production

⁵ According to government officials, an important element of the PADETES approach is the promotion of the active participation of rural communities in problem identification, analysis, planning, implementation and evaluation.

packages and the beneficiaries were mainly those farmers who live in high rainfall areas of the country. Over the years, however, the packages have been diversified to address the needs of farmers who live in different agro-ecological zones of the country. Currently, PADETES promotes packages on cereals, livestock (dairy, fattening and poultry), high economic value crops (oil crops, pulses, vegetables and spices), improved post-harvest technologies (handling, transport and storage), agro-forestry, soil and water conservation and beekeeping developed for different agro-ecological zones (highland mixed farming system, highland-degraded and low moisture, lowland agro-pastoralist and lowland pastoralist zones).

The major elements of the extension package are fertilizer, improved seeds, pesticides and better cultural practices mainly for cereal crops (teff, wheat, maize, barley, sorghum and millet). PADETES uses EMTPs and a technology transfer model which, in principle, nurtures linkages between research, extension, input and credit distribution. Under PADETES the major tasks of extension agents include organizing demonstration trials, assisting farmers in obtaining agricultural inputs and channelling farmers' problems to the relevant organizations, particularly to the district agricultural office.

The PADETES approach is meant to improve access to inputs by providing credit in kind. As farmers cannot borrow from banks due to collateral problems, extension credit is guaranteed by the regional governments and administered jointly by them and the two government banks (the Development Bank of Ethiopia and the Commercial Bank of Ethiopia). Loans are taken up by the regional governments and channelled into the district administration offices.⁶ Farmers participating

⁶ In the new extension system, input supply and credit are dealt with in one transaction. The procedures involved in input loan disbursement are as follows. The regional government borrows directly from the banks and relies on its administrative machinery and peasant organizations to disburse and collect the loan. Farmers have to apply via the service co-operatives, which submit applications for credit to the district agricultural office. The district finance office is also involved. The service co-operative collects a 25 per cent down payment of the (contd. over).

in PADETES then receive credit in kind, via the district agricultural and finance offices. Participants agree to allocate land for a demonstration plot and pay a 25 per cent down payment on the input package at the time of planting, with the balance due after harvest. The participants pay a 10.5 per cent interest rate on the input loan. In 1995–1996 the Ethiopian government sponsored the establishment of about 36,000 half-hectare on-farm demonstrations. In the 1996–1997, 1997–1998 and 1998–1999 production years, the number of government-sponsored demonstration plots was 600,000, 2.9 million and 3.8 million, respectively (MOA 1997, 1998b, 1999). The trend is for this number to keep growing. Likewise, the number of farmers participating in the new extension programme increased from 35,000 in 1995–1996 to 3.7 million in 1998–1999.⁷

As to the number of extension personnel in the country, the author's discussion with a senior extension expert in the Ministry of Agriculture in September 2001 revealed that this is estimated at little more than 14,000. Most hold certificates and diplomas but lack adequate and appropriate technical and communication skills. This figure is too small, even by the standards of sub Saharan Africa, when viewed in relation to the number of farmers the extension personnel have to serve.

⁶ (contd.) input prices. An agreement is signed between the finance office and the co-operative. The down payment and signing result in a delivery order by the finance office, which the co-operatives use to collect their stock from the designated supplier

⁷ Quinones and Takele (1996) and MOA (1997, 1998, 1999) reported that the average yields of different crops obtained from EMTPs are much higher than the traditional averages. For instance, according to MOA (1999), in the 1998–1999 production year, the average maize, sorghum, teff, wheat and barley yields of EMTPs farmers in the Oromia National Regional State were 247%, 67%, 100%, 225% and 129% above the traditional averages respectively. The corresponding figures for the Southern Nations, Nationalities and Peoples Regional State were 205%, 71%, 64%, 207% and 141% respectively

II. Methodology

The data used in this paper were obtained from the fifth Ethiopian Rural Household Survey conducted by the Economics Department of Addis Ababa University in collaboration with USAID. Four successive surveys had been conducted prior to this one and all were aimed at generating time-series data on the Ethiopian rural households. The fifth survey was carried out in 1999 and the collected data refer to the 1998–1999 cropping seasons.

This paper is based on data collected from a total of 1482 household heads randomly selected from four regional states of the country. More specifically, data were collected from 16 sites located in the Amhara National Regional State (ANRS), the Oromia National Regional State (ONRS), the Southern Nations, Nationalities and Peoples Regional State (SNNPRS) and the Tigray National Regional State (TNRS).⁸ According to MEDaC (2000), these four regions account for about 86 per cent of the country's population (61.7 million). More specifically, in 1999, the total population of the ANRS, ONRS, SNNPRS and TNRS was 16 million, 21.7 million, 12.1 million and 3.6 million, respectively. The same source shows that the ANRS, ONRS, SNNPRS and TNRS account for 12.7%, 28.2%, 9% and 4% of the total land area of the country.

Seven of the 16 study sites, namely Adele Tique, Bako Tibe, Debre Zeit–Sherba Goditi, Eteya, Jimma–Somodo, Koro Degaga–Sodere and Shashemene are located in the Oromia National Regional State. Four of the sites, Debre Berhan, Dinki–Ankober, Shumsha–Lalibela and Yetmen, are located in the Amhara National Regional State. Three sites, namely Domma, Durame–Azedebo and Gara Godo–Areka, are located in the

⁸ This study covered only four of the nine regional states of the country. These regions constitute the densely settled, mixed-farming regions of the temperate and central highlands of the country. About 90 per cent of the rural population of the country is found in these regions (CSA, 1999). More specifically, about 27%, 36%, 21% and 6% of the rural population of the country live in the ANRS, ONRS, SNNPRS and TNRS respectively. These four regions account also for almost all the nation's agricultural production

Table I: regional distribution of the respondents

Region	Number of respondents	Percentage
Amhara	466	31.4
Oromia	625	42.2
Southern Nations, Nationalities and Peoples	241	16.3
Tigray	150	10.1
Total	1482	100

Southern Nations, Nationalities and Peoples Regional State. The remaining two, Haressaw and Geblen, are located in the Tigray National Regional State. The regional distribution of the respondents is presented in Table I.

The survey employed a structured questionnaire. The questionnaire was prepared to collect information on various aspects of agriculture such as landholding, crop and livestock production, informal and formal credit services, demography, social phenomena, natural occurrences, environmental degradation and conservation attempts, off-farm activities, extension services and the supply use of commercial inputs.

III. Results and discussion

The mean age of the respondents at the time of the survey was 49 years but there were extreme variations, the oldest being 95 and the youngest 18 years old. About 75% and 24% of the household heads were men and women, respectively. One hundred and twelve respondents (7.6% of the total respondents) reported that they had served as contact farmers during the military regime. A closer look at the regional distribution of the respondents who had served as contact farmers during the military regime shows that 21, 66, 13 and 12 were from the ANRS, ONRS, SNNPRS and TNRS, respectively.

One surprising outcome of this study is that the majority of the former contact farmers had not participated either in PADETES or the SG 2000 extension programme at the time of the survey. More specifically, only 51 (45.5%) and 8 (7.1%) of the former contact farmers reported that they had participated in PADETES and SG 2000 extension programme at

Table II: Number of sample respondents who served as contact farmers in the SG 2000 extension programme by region, 1994/95–1998/99 cropping seasons

Cropping Season	ANRS	ONRS	SNNPRS	TNRS	TOTAL
1994/95	0	14	2	1	17
1995/96	1	14	2	2	19
1996/97	1	20	3	4	28
1997/98	2	16	4	5	27
1998/99	4	22	4	5	35

the time of the survey, respectively.⁹ It is quite obvious that, under the military regime, contact farmers had been working very closely with extension agents and shared their experience and skills with a number of follower farmers. Therefore, the fact that the majority of the former contact farmers had not participated either in PADETES or SG 2000 extension programme at the time of the survey, must be considered as a very important point of concern in that it reflects lack of continuity in extension work.

The survey results reveal that the number of sample farmers who served as contact farmers in the SG 2000 extension programme was very limited (Table II).

Table II shows clearly that only a very small proportion of the sample respondents had been participating in the SG 2000 extension programme over the 1994–1999 period. However, the number of sample respondents who participated in the new extension programme had been growing over the same period (Table III).

⁹ The regional distribution of the 51 former contact farmers who reported that they had been participating in PADETES shows that 7, 31, 11 and 2 were from the ANRS, ONRS, SNNPRS and TNRS respectively. Six of the eight former contact farmers who had taken part in the SG 2000 extension programme were from the ONRS, one was from the ANRS and the remaining farmer was from the TNRS

Table III: Number of sample respondents who participated in PADETES by region, 1994/95–1998/99 cropping seasons*

Cropping Season	ANRS	ONRS	SNNPRS	TNRS	TOTAL
1994/95	3 (0.6)	88(14.1)	9 (3.7)	8 (5.3)	108 (7.3)
1995/96	7 (1.5)	105(16.8)	12 (5.0)	9 (6.0)	133 (9.0)
1996/97	5 (1.1)	125(20.0)	36(14.9)	13 (8.7)	179(12.1)
1997/98	10 (2.1)	132(21.1)	86(35.7)	14 (9.3)	242(16.3)
1998/99	20 (4.3)	133(21.3)	94(39.0)	12 (8.0)	259(17.5)

* Figures in parentheses refer to percentages

Table III shows that the proportion of sample farmers who took part in the new extension programme had been growing steadily in the SNNPRS. The proportion had been more or less stable in the ONRS and TNRS between 1996/97 and 1998/99. In the ANRS only a very small fraction of the sample farmers (less than 5 per cent) had participated in the programme over the 1994–1999 period.

Tables II and III show that the vast majority of the sample respondents in all regions had not participated either in PADETES or the SG 2000 extension programme over the period under study. The sample respondents who had not participated either in PADETES or the SG 2000 extension programme at the time of the survey were asked to point out the reasons for their non-participation (Table IV).

Table IV shows that lack or shortage of working capital for down payments, shortage of land and the limited geographical coverage of the programme are the principal factors responsible for the non-participation of the sample respondents in either PADETES or the SG 2000 extension programme. Table IV shows also that about 41 per cent of the respondents cited the shortage or lack of working capital as an important barrier to the adoption of modern agricultural inputs. This is partly explained by the substantial increase in the prices of these inputs. Given the fact that most of these inputs (especially fertilizer and agro-chemicals) are imported and the national currency has been losing its

Table IV: Reasons for non-participation in PADETES or SG2000 Extension Programme, by region

Reasons	Percentage of non-participant sample respondents				
	ANRS	ONRS	SNNPRS	TNRS	TOTAL
Shortage of land	19.6	30.0	30.2	25.2	25.6
Shortage/lack of working capital for down payments	42.9	29.8	59.7	51.9	40.8
Did not repay previous loans	2.1	2.8	0.7	2.2	2.2
Not interested in the programme	3.0	2.4	0.0	2.2	2.3
Insufficient knowledge of the programme's potential impact	4.4	3.3	0.0	3.0	3.3
Shortage/lack of labour	1.2	1.5	5.0	0.0	1.6
Participants are selected by Peasant Association Officials	1.6	2.6	0.0	5.9	2.3
Not invited to participate	0.7	4.6	0.0	1.5	2.2
The programme is not more profitable than traditional methods	2.5	1.1	0.0	0.0	1.4
High interest payable on input loans	0.0	0.9	2.2	0.7	0.7
Shortage of draft power	0.2	0.2	0.0	0.0	0.2
High price of inputs	0.2	0.7	0.7	0.0	0.4
The programme regulations are too strict	0.5	0.2	0.0	0.0	0.3
Sharecropped/rented out land	6.2	0.2	0.7	5.2	3.1
Do not want to use fertilizers	0.5	0.0	0.0	0.0	0.2
Request turned down	0.5	0.7	0.0	0.0	0.4
Fear of taking loans	0.2	1.7	0.0	0.0	0.8
No information on the programme	10.6	16.7	0.7	0.0	10.6
Other responses (not specified)	3.2	0.7	0.0	2.2	1.7
Total	100	100	100	100	100

value over the past ten years, their prices have been increasing every year. In addition, up to 1997 fertilizer prices had been subsidized and farmers paid relatively lower prices even after the national currency was devalued in 1992. When the government subsidy was lifted in January 1997, the free market prices became so exorbitant that they put fertilizer beyond the reach of many farmers. There was even a widespread fear that fertilizer consumption would plummet. However, fertilizer consumption has been increasing nationally as a result of the new extension policy which promotes fertilizer credit as one of the essential elements of the technology package.¹⁰

Input loans are an integral part of the new extension programme on the grounds that they play a pivotal role in facilitating increased access by poor farmers to modern agricultural inputs. However, the input loan scheme is associated with two ineluctable problems: on one hand, as it is not based on a realistic assessment of the borrowers' financial needs, it is difficult to ascertain whether or not the credit has reached the very people who need it and, on the other hand, it is awkward to administer and the risks of non-repayment loom large.

In an effort to minimize the default rate and the loss of their yearly budgets which they use as collateral for the bank loans, regional governments have frequently called on local police to enforce repayment. This has resulted in some confiscation or the forced liquidation of farm assets (such as animals and equipment) to meet repayments (Howard et al. 1999). As the PADETES system is intimately tied up with the delivery of credit in kind, the coercive loan collection system seems to dissuade many farmers from participating in PADETES.¹¹ Similarly, the fact that input loans have to be repaid right after harvest, when the prices of agricultural produces are extremely low, may discourage many farmers from participating in PADETES.

¹⁰ According to the National Fertilizer Industry Agency of Ethiopia, the total fertilizer consumption in 1994, 1997 and 1999 was 190,000, 220,431 and 285,823 tons respectively

¹¹ Dercon (2000) argues that the nature of credit arrangements reduces the attractiveness of input uptake. To be eligible, a farmer must have repaid all previous loans. A service co-operative may not receive new credit if

Table IV shows also that about 26 per cent of the respondents identified shortage of land as being the principal reason for their non-participation either in PADETES or in SG 2000 extension programme. The survey results show that the average landholding of the sample respondents at the time of the survey was 1.34 hectares and about 29 per cent of the respondents had less than 0.75 hectares of land. As land is state-owned and farmers are not allowed to buy and sell it, an increase in the rural population results in the further fragmentation of holdings.

Another interesting outcome of this study is the respondents' view on the non-participatory nature of PADETES and the SG 2000 extension programme. As indicated in Table IV, 2.3 per cent of those respondents who had not participated either in PADETES or the SG 2000 extension programme reported that the participants were selected by officials. Similarly, 2.2 per cent indicated that they had not been invited (approached) to take part in these programmes. These results suggest the new extension system is not as participatory as its name implies.

The results are also in complete agreement with MOA (1998b), which reported that in all regions 75–80 per cent of the farmers who participated in PADETES were selected by the local extension agents. The rest were either selected by the officials of the Peasant Association or participated in the programme on their own initiative. These results show that extension agents tend to work with those 'model' farmers who show an interest in the extension packages.¹² Similarly, in his study on the constraints to agricultural extension work in Ethiopia, Belay (2002) points

¹¹ (contd.) one member defaults on the loan. This measure is applied even though no local community participatory measures exist to screen borrowers. Input credits are expected to be paid regardless of the harvest and there are no provisions to help even those requesting the postponement of repayment to the next season

¹² One of the criteria used to evaluate the performance of extension agents is the number of farmers adopting the technology packages in their area of work. In other words, quotas (the minimum number of farmers who should take up the technology packages) are imposed on extension agents. As a result, the extension agents use whatever means available to persuade farmers to adopt the packages and thereby meet their quotas

Table V: Respondents who used fertilizer and improved seed in the 1998–1999 main cropping season, by region

	Percentage of respondents				
	ANRS	ONRS	SNNPRS	TNRS	TOTAL
Fertilizer	45.3	75.4	73.4	19.3	59.9
Improved seed	5.4	21.9	45.6	8.7	19.2

out that farmers make a very marginal contribution in designing and formulating extension activities. He also notes that neither the farmers nor the frontline extension agents are consulted in the course of policy formulation.

When requested to indicate whether or not they had been using modern agricultural inputs, about 60 per cent reported that they used fertilizer in the 1998–1999 main cropping season. The proportion of sample respondents who used fertilizer was the highest in the ONRS and the lowest in the TNRS. Similarly, 19 per cent of the respondents reported that they used improved seed in the same period. At regional level, the percentage of respondents who used improved seed was the highest in the SNNPRS and the lowest in the ANRS (Table V).

One important factor in the adoption of improved inputs is the availability of useful and reliable extension services. In this connection, the survey results show that only 13.3 per cent of the sample respondents had been visited by extension agents in the 1998–1999 main cropping season. This could be explained by the fact that the number of extension agents in the country is extremely small in relation to the number of people whom these agents have to serve. In fact, the proportion of sample farmers visited by extension agents varied from one region to another. More specifically, it was 4.3%, 15.5%, 29.5% and 6%, in the ANRS, ONRS, SNNPRS and TNRS, respectively. It is also interesting to note that 56.3%, 33.5% and 7.7% of the sample respondents who participated either in PADETES or SG 2000 extension programme qualified the assistance and advice they had received from extension agents, while adopting improved inputs, as very useful, useful and not useful, respectively, while 2.6 per cent did not comment on the nature of services rendered by extension agents.

Similarly, participating farmers reported that they were visited, on the average, 4.4 times by extension agents in the 1998–1999 main cropping season. This average masks differences which exist among regions. Participating sample farmers reported that they were visited, on the average, 3.3 times in the ANRS, 5.6 times in the ONRS, 2.6 times in the SNNPRS and 3.2 times in the TNRS.

As already noted, the shortage of extension professionals is one of the most serious problems of agricultural extension work in Ethiopia, contributing to the limited extension service coverage and poor adoption of agricultural technologies. Although there has been an increase in the number of extension agents throughout the country over the last five years, each extension agent is still expected to reach a large number of farmers. The extension agent to farmer ratio varies from one region to another. It was reported to be 1:866 in the ANRS, 1:880 in the ONRS, 1:570 in the SNNPRS and 1:1500 in the TNRS (MOA 1998b, 1999).

All the sample respondents were asked to indicate whether or not they planned to participate (or continue participating) in the new extension programme in the event that this happens to be the sole means of getting extension services in the future. In this respect, 966 respondents (67.5 per cent) reported that they would participate (or continue participating) in the programme, 448 respondents (30.2 per cent) stated that they had no intention of participating in the programme and the remaining 38 (2.6 per cent) did not reveal their intentions. Of course, the proportion of sample farmers who reported that they would participate (or continue participating) in the new extension programme varied from one region to another. It constituted 54.7%, 81.9%, 54.8% and 64.7% of the sample respondents in the ANRS, ORNS, SNNPRS and TNRS, respectively. The sample respondents who reported that they intended to participate (or continue participating) in the new extension programme were also asked to list down the major reasons influencing their decision to do so in the future (Table VI).

Table VI makes it clear that the principal motives for the decision to take part in the new extension programme in the future include the need to get fertilizer at the right time, the possibility of procuring improved

Table VI: Reasons for the willingness to participate (or continue participating) in the new extension programme in the future

Reasons	Percentage of respondents*				
	ANRS	ONRSSNNPRS	TNRS	TOTAL	
To get fertilizer at the right time	71.3	69.0	79.4	80.0	72.0
To purchase fertilizer at a lower price	49.0	45.7	23.7	65.3	45.5
To get improved seed	63.3	71.6	85.5	67.4	70.9
To learn about new techniques of production	43.4	59.2	55.0	34.7	52.3
Others (not specified)	1.6	0.8	0.8	-	0.9

*The percentages do not add up to 100 per cent because of multiple responses

seed, the desire to learn about new techniques of production and the possibility of purchasing fertilizer at lower price, in that order.

Those respondents who reported that they had no intention of participating in a new extension programme were also asked to list down the major reasons which influenced their decision. Their responses are summarized in Table VII.

Table VII reveals that the vast majority of the respondents who reported that they had no intention of participating in the new extension programme in the future cited the lack or shortage of working capital for down payments, shortage of land, the feeling that the packages are not profitable and the lack of suitable land as the principal reasons which would dissuade them from participating in a new extension programme.

One interesting outcome of this study is the respondents' view on the profitability of improved inputs. About 30 per cent the respondents who reported that they had no intention of participating in the new extension programme said that modern inputs were not more profitable than the traditional ones.¹³ This could be partly explained by the fact

¹³ Profitability analyses of maize and wheat production made by Quinones and Takele (1996) and Chimdessa (1998) reveal that the EMTPs have been more profitable than the traditional plots

Table VII: Reasons for the non-willingness to participate in the new extension programme in the future

Reasons	Percentage of respondents*				TOTAL
	ANRS	ONRSSN	NPRS	TNRS	
Shortage/lack of working capital for down payments	65.2	64.7	81.6	78.6	70.8
The feeling that the packages are not profitable	32.3	41.2	20.4	26.2	30.5
Lack of suitable land for the package	19.5	35.3	41.7	33.3	30.2
Shortage of land for the package	27.4	24.7	39.8	52.4	32.7
Others(not specified)	4.3	1.2	2.9	-	2.8

(* THE PERCENTAGES DO NOT ADD UP TO 100 PER CENT BECAUSE OF MULTIPLE RESPONSES)

that in many parts of the country extension agents promote technologies as "blanket recommendations". In other words, these technologies are developed outside the users' system and are extended to farmers without prior adaptability trials. Available evidence shows that such a practice imperils the whole effort of extension work in the country. According to Sandford (1997):

Ethiopia is a country of enormous ecological diversity ... such diversity greatly complicates the task of developing and testing improved agricultural technology. The truth is that the new technologies currently being advocated by the agricultural extension services were developed and tested in one set of environments (usually the most favourable) and are now being applied in others (often very marginal ones), for which they were not designed or even tested and where they may actually produce less than the old technologies they are intended to replace.

The current reorganization of the national agricultural research system is expected to do away with these problems. But, given the country's

ecological diversity, it will take many years before technologies suitable to the different locations of the country are developed.

As already noted, extension agents play a leading role in the popularization of improved inputs and cultural practices in rural areas. In the new extension programme, agents are under pressure to work with as many farmers as possible. In many parts of the country one agent may be required to supervise the demonstration plots of more than 300 farmers. Moreover, extension agents are quite often overloaded with different assignments, which are, in most cases, not related to their normal duties. Table VIII presents the respondents' view about the activities in which the extension agents are engaged.

One can deduce from Table VIII that extension agents are not free to concentrate entirely on promoting improved technologies, identifying farmers' production problems and eventually bringing them to the attention of researchers. Over the years, the involvement of extension agents in non-extension activities has played against their reputation as development workers. Many people in rural areas continue looking at the extension agents as government spokesmen rather than facilitators in the rural development endeavour. If agents are to spearhead rural transformation in the country, their duties should be clearly defined

Table VIII: Principal activities of extension agents as perceived by sample respondents, by region.

Activity	Percentage of respondents*				
	ANRS	ONRSSNNPRS	TNRS	TOTAL	
Introducing modern inputs	69.8	72.6	74.2	66.9	71.5
Popularizing new cultural practices	40.0	62.8	55.4	50.0	53.3
Organizing farmers for credit access	20.2	21.1	23.6	30.0	22.1
Mobilizing farmers for public work	13.3	7.3	8.2	24.6	10.9
Collecting loans repayments	10.5	17.3	16.7	3.1	13.8
Collecting taxes	14.2	5.8	3.9	3.1	7.8

(* The percentages do not add up to 100 percent because of multiple responses)

and they should not be made to handle other responsibilities that will compromise their real professional integrity.

In this respect, Howard et al. (1999) noted that many of the extension agents interviewed expressed concern about their heavy involvement in credit administration—not only because it kept them from their technical responsibilities (advising farmers on use of improved technologies), but also because their role as credit collection agents had a negative impact on their personal relationships with farmers.

It is, however, worth noting that some of the activities, such as the distribution of inputs and credit, could well be handled by the agents, provided that complicated administrative red tape is not involved and they do not take up too much of the agents' time. Even then, this needs to be done with maximum care as it may affect the extension agents' relationship with farmers.

IV. Conclusion

This paper focused on assessing the participation of farmers in the new extension system and identifying the principal barriers to the adoption of modern agricultural inputs. It is believed that this study, although limited in coverage and scope, provides information to all concerned in agricultural development so that they can make informed decisions.

The historical review reveals that extension work in the country has not been participatory in its nature. Extension programmes and policies have been formulated without due consideration to the farmers' opinions and their traditional knowledge system. Moreover, both the historical review and the survey results confirm that only a very small percentage of the country's rural population has access to agricultural extension services. One interesting outcome of this study is that the number of sample farmers who used fertilizer and improved seed had been growing steadily over the 1994–1999 period.

This study has also pointed out that the shortage or lack of working capital, the shortage of arable land, the shortage of extension personnel, the inadequacy of relevant technologies (as far as their adaptation to the different ecological, economic and sociocultural conditions of the country) and the involvement of extension agents in non-extension

activities were the most important barriers to the adoption of modern agricultural inputs in the country.

In the light of these results it is imperative that policymakers pay utmost attention to the constraints that beset peasant agriculture. The issues which need immediate attention include, among others, undertaking adaptability trials before popularizing extension packages, giving special consideration to the farmers' indigenous and experience-based knowledge system in research and extension work, changing the way the input credit arrangements are organized and enforced and encouraging resource-poor farmers to participate in the programme.

Attempts must also be made to make agricultural research and extension activities complementary and participatory in nature. The fact that agricultural research and extension are carried out by two different bodies with very limited contact and working relationships, has made it difficult to develop and disseminate technologies adapted to the farmers' conditions. It is only when extension and research activities are complementary that fruitful results can be achieved. Consequently, concerted efforts need to be made to create a seamless web between the two. As it is impossible to expect success from rural development interventions formulated without the active participation of the target population, farmers should be empowered and encouraged to participate in the planning and execution of extension programmes. Similarly, the contact between extension agents and farmers must be strengthened by reducing the ratio of farmers to development agents and relieving the extension agents of activities which compromise their role as extension educators.

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