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Agricultural Research and Delivery in the South-Eastern Highlands of Ethiopia: A Case Study of the SG-2000 Approach in Hitosa District

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ATPS comprises a network of multidisciplinary researchers in 15 African countries, namely, Botswana, Ethiopia, Ghana, The Gambia, Kenya, Lesotho, Liberia, Malawi, Nigeria, Sierra Leone, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. It is jointly funded by the International Development Reasearch Centre (IDRC), the Carnegie Corporation of New York and the Rockefeller Foundation.

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(a) generate a critical mass of the knowledge for strengthening policy making and for identifying and assessing the impact on past and present policy on technological change and its consequences for development;
(b) build a continuous interactive process of knowledge diffusion by fostering linkages among and between researchers researchers and the private sector, policy-makers and other end-users; and
(c) disseminate and encourage utilization of research results through publications, a biennial international conference, dissemination seminars, and policy round tables.

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Dr. Osita Ogbu
Executive Director

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Chapter One

Introduction to the Study

This study is aimed to contribute to our understanding of technical change and the process of technology transfer and to contribute to the understanding of the underlying factors which affect technical change in rural areas of one of the world's poorest countries. Agriculture is recognized as the foundation of the Ethiopian economy, because about 85 percent of the population is engaged direetly in agriculture, which is the main source of the raw materials for much of the country's manufacturing industries. Hence, industrialization of the country and improvement of the standard of living of the people depend to a large extent on the development of agriculture.

This underscores the need to utilize science and technology both from internal and external sources, in order to develop the agricultural sector. In spite of the country's potential for agricultural development, it has been unable to feed itself, and the problem of food shortage and malnutrition is becoming the single most critical area of concern in the country. Among the strategies of agricultural development, technical change for the maximisation of productivity through introduction of improved farming methods is considered crucial. However, despite different approaches being tried to bring about technical change, both the research and development efforts and the dissemination of agricultural technology leave much to be desired.

This study is therefore about practical issues of technical change using a case study.

Chapter Two

Problems in perspectives and Approaches

Background Information

Ethiopia lies north of the Equator occupying a total land area of 1.22 million km^2 (ESA, 1997). It is the oldest independent African nation and is one of Africa's most underdeveloped countries. The country contains some of the most mountainous and diverse terrain in the world.

In 1998, CAS analysts estimated the total population to be 59.9 million of which 51.2 are rural and 8.7 are urban. (CSA, 1998, P.18). The population was expected to reach 63.5 million by the year 2000. Of the total population ,43.88 percent were 14 years and under, 52.97 percent were between 15 and 64 years old, and 3.15 percent were 65 years old and above (calculated from CSA statistical abstract). This shows that close to half of the population is unproductive and dependent on the rest of the population. The urban population, defined as a locality with 2000 or more inhabitants, comprises about 14.51 percent of the total population. About 2.5 percent of the annual increase in urban population is attributed to natural growth and more than 4 percent to migrations from the rural areas.

According to Nelson and Chaplain (1981, P.70) about 70 percent of Ethiopia's inhabitants live in the highlands, where a large number resides in the temperate climate zone between altitudes of 1500 and 2400 metres. The highlands are most important agro-ecological regions of the country where most of the crop and livestock production is undertaken . In Ethiopia, the surplus producing areas are Gojam, Shoa and Arsi Regions for all crops, Arsi and Bale for wheat and barley, Wellaga and east Shoa for maize, Gojam and Shoa for teff. These are mainly situated in the highlands.

The most important feature of the national economy is that over 85 percent of the population lives in the country, engaged in traditional crop cultivation and cattle herding, with both activities yielding little, if any, surplus.

In 1993/94, agriculture contributed 53.9 percent of the GPD, industry 10.6 percent while 13.3 percent was derived from distribution services (trade and transport) and about 22.2 percent from other services (CSA, 1997). Crop production accounted for about 75.79 percent

of the total agricultural production. About 81.37 percent of the total crops were cereals, including teff, wheat, barley, maize and sorghum; 1.49 percent oilseeds, 3.09 percent pulses and 14.05 percent other crops mainly sugarcane (See *Table 1*).

Table 1: Area Under Cultivation, Yield and Production of the Major Crops 1994/95 - 1996/97

Kinds of crop	1994/95			1995/96			1996/97		
	Cultivated area (000 ha)	Yield qt/ha yield	Total Production (000qt)	Cultivated area (000ha)	Yield (qt/ha)	Total Production (000qt)	Cultivated area (000ha)	Yield (qt/ha)	Total Production (000qt)
Cereals	6448.6	9.1	58484.9	7670.5	12.1	92654.0	6688.6	12.9	86293.3
Barley	1136.1	8.3	9370.1	1058.5	10.6	11228.3	697.7	10.6	7423.9
Maize	1418.3	9.6	13637.1	1851.1	16.8	31053.9	1316.9	19.2	25320.0
Sorghum	918.0	7.6	6960.1	1328.7	13.6	18051.1	1400.0	14.3	20073.5
Millet	230.4	9.7	2228.9	0	0	17226.5	290.7	10.2	2961.7
Teff	1899.0	9.8	18582.0	2162.9	8.3	17226.3	2167.8	9.2	20018.9
Wheat	801.1	9.1	7270.6	932.4	11.9	11119.8	772.2	13.0	10015.9
Oats	45.7	9.5	435.9	63.7	13.2	838.1	43.4	11.1	479.5
Oil seeds	312.4	3.2	996.6	346.8	0	0	417.2	11.8	1583.5
Linseed	115.3	4.8	553.6	112.7	5.1	575.4	148.2	4.6	676.2
Neug	197.1	2.3	443.0	224.7	3.9	866.5	250.5	3.3	834.5
Sesame	0.0	0.0	0.0	9.4	0	0	18.5	3.9	72.8
Pulses	919.7	8.6	7946.6	1008.8	8.6	8662.1	418.8	23.7	3275.3
Chick peas	178.9	7.0	1245.1	150.4	8.2	1232.4	147.9	8.6	1264.6
Field peas	162.6	9.1	1484.5	203.7	7.3	1493.0	158.1	6.7	1063.0
Haricot beans	88.4	5.2	456.0	155.5	7.0	1091.0	112.8	8.4	947.6
Horse beans	342.6	10.9	3747.7	336.7	10.7	3593.7	329.3	9.7	3206.8
Lentils	61.9	6.1	379.1	83.4	4.8	403.1	52.8	6.5	344.9
Vetch	85.3	7.4	634.2	76.0	10.6	806.8	104.4	11.5	1199.4
Other Crops									
Sugarcane	8.7	1318	11467.0	9.6	1648.1	15821.8	9.1	1637.2	14898.9

Source: Compiled from CSA, Statistical Abstract, 1997, P.93. T

For cereals, barley accounts for 8.6 percent, maize 29.34 percent, sorghum 23.26 percent, teff 23.20 percent, wheat 11.61 percent. Others are millet and oats (See *Table 1*).

Agricultural products are the main export commodities, and 90 percent of the total exports are derived mainly from coffee, pulse, oilseeds and hides and skins. Coffee alone accounts for about 50-60 percent of the total exports.

The eastern and north-eastern highlands produce more maize and sorghum while the western, south western and south highlands are more oriented toward the production of maize as well as root and tuber crops. The central highlands are most suited to the production of small grains (wheat, barley and teff).

Crop production follows the major agro-ecological zones of the country and dominates agricultural production in the country, accounting for 60 percent of the Agricultural Gross Domestic Product (AGDP). The livestock sector contributes about 30 percent to the AGDP and provides per capita consumption of about 8.2 kg/annum of red meat and 16-18 kg/annum of milk (MOPED, 1993, P. 3).

The livestock population is the largest in Africa and the ninth in the world. The current livestock population is estimated at 28 million cattle, 24 million sheep and about 17 million goats. It also estimated that there are 58 million chickens, about one million camels, and a large number of equines (MOPED, 1993).

According to the Land use Planning and Regulatory Department of the Ministry of Agriculture (MOA), some 66 percent of the area is potentially suitable for agriculture. (See *Table 2.)*

Table 2: Current Land Uses in Ethiopia

Land Use	Area (000 ha.)	%
Cultivated land	16,509	14.8
Annual crops	14,613	13.1
Perennial crops	1,896	1.7
Grazing and browsing land	56,888	51.0
Forest, shrubs etc	13,051	11.7
Forest	4,016	3.6
Shrubs and others	9,035	8.1
Currently unproductive	4,239	3.8
Currently unutilized	20,859	18.7
Total	111,546	100

Source: (MOPED) Ministry of Planning and Economic Development 1993, P 9).

Ethiopian soils are generally considered to be fertile, although they vary widely. In many areas, erosion constitutes an increasing threat due to deforestation and lack of crop cover. So far except for estimates, no detailed description, classification or evaluation of the soils has been prepared.

Ethiopia is characterised by great climatic differences due to large variations in altitude. Altitude-induced climate conditions thus form the basis for three distinct and clearly recognizable environmental zones — cool, temperate and hot — which have been known to Ethiopians since antiquity as the *Dega*, the *Weina-dega* and the *Kola*, respectively (Nelson and Chaplain, 1981, P. 66).

Obviously, the country has a great potential for agriculture. Despite this fact, the country is currently one of the most backward agrarian nations in the world. The sector is beset with complex problems which have contributed to its overall low productivity, prolonged and recurring droughts, civil wars, wrong policies, archaic agricultural methods, lack of appropriate technologies and the absence of capital and other hurdles have continued to impede the development of this sector.

This makes it very fragile and vulnerable in the face of the prevailing natural and man-made problems.

The relative size of Ethiopia's peasant agricultural sector implies that its performance is critical to the overall economic growth. In addition, its close interrelationship with the rest of the economy makes the agricultural sector vulnerable to changes in other sectors. Obviously, the speedy development on the Ethiopian economy depends on the development of agriculture, which is expected not only to influence the living standards of the population who are dependent on agriculture but also to exert influence on the industrial sector. It is because of this and other related factors on the one hand that the Ethiopian Peoples Revolutionary Democratic Front (EPRDF) has stressed that the country's development must be founded on Agricultural Development Led Industrialization (ADLI). As a result, it has reorganized the Institute of Agriculture Research (IAR) into the Ethiopian Agriculture Research Organization (EARO) and has instituted an extension and delivery system based on the SG-2000 approach.

In the past, the research institutions and extension agents tried different development approaches, preached the use of improved agricultural practices to raise output, and carried out demonstrations of improved agricultural practices besides encouraging farmers to adopt them. However, in general, past efforts had little success. For example, a 1993 government-sponsored study on fertilizer policy shows that in plant nutrient terms, small holders in Ethiopia consume on average above 6.2 kg/ha compared to 44.3 kg/ha in Kenya and 144.3 kg/ha in Egypt. Fertilizer consumption levels of small-holder farmers in Ethiopia are among the lowest in Africa.

The critical characteristic of the transformation of agriculture requires an efficient sustainable approach for constant generation and diffusion of improved agricultural practices.

The critical question is how fast and how widely the opportunities opened up by the new improved agricultural practices can be diffused among millions of individual farmers.

The diffusion of technology is more difficult in the agricultural sector than in industry because, as Wilkening explains, it is affected by the wide variation in physical and biological factors influencing plant and animal life, the specific economic factors affecting costs and returns to the farmers of the locality, and by individual differences in motivation, acceptance of new ideas and techniques.

In addition there is the issue of resource endowment, policy environment, and a problem of dealing with many more units widely scattered geographically.

Furthermore, there is a problem of methodology for the generation of appropriate technology to suit the technological needs of the different units. Since the pace and extent of the diffusion and adoption are influenced by many factors, it is imperative that scientific understanding be created to shed light on the determinants and the dynamics of this behaviour.

Questions arise as to what factors or conditions, environmental, social, economic, political or otherwise cause peasants to behave, respond or act in a particular way when confronted with the option of accepting or rejecting a particular innovation? What conditions underline the

different levels of performance for individuals or groups of farmers? What factors account for the related time lag in adopting innovations?

These questions lead to the search for a systematic interpretation and explanation of innovation behaviour patterns, and the conceptualization of the theoretical system.

Modernization of Agriculture: Some Reflections of the Past Approaches

The stagnation of the agricultural sector and the escalating population growth are among the most important factors retarding Ethiopia's socio-economic development. In the past, peasant farms, state farms and producer co-operatives have dogged efforts by experts and donors attempting to bring change to Ethiopia.

Agricultural extension has existed since 1954 and agricultural research goes back to the early fifties when the agricultural school at Jim Ma was opened in 1952, and the College of Agriculture at Alemaya (now the Alemaya University of Agriculture (AUA) in 1953. The package approach to development in a specific geographical area became popular during the early 60s.

The first Comprehensive Package Programme, the Chilalo Agricultural Development Unit (CADU) was undertaken with the assistance of the Swedish International Development Agency (SIDA) in 1997. CADU employed the Model Farmer approach then worked closely with him, using improved inputs and methods with the expectation that the practices would be imitated by farmers. This approach was criticised both from outside and within CADU itself. The empirical studies made at the time showed that the approach was only partly successful and that it was the most efficient way of disseminating knowledge. Moreover, the model farmers generally did not wish to upset the local landlords who also formed the local government.

Model farmers were already endowed with great economic resources and being landowners were able to effectively utilize the improved inputs for their own economic advancement. They converted themselves into commercial farmers. Evaluation of CADU after three years of operation concluded that it was too expensive to duplicate elsewhere in Ethiopia.

The second Comprehensive Package Project was the Wallaita Agricultural Development Unit (WADU) established in 1971 which employed an extension strategy that deliberately avoided Model Farmers in the demonstration of improved technology packages. Instead, the demonstrations were undertaken on peasant farms that were relatively more resource poor. For the first time, the extension agents were locally recruited and were required to have an agricultural background and proficiency in the local language, knowledge of the local social values and an educational background of grade 9-11. Evaluation found that the WADU strategy was more effective than that of CADU in terms of technology transfer (Tesfaye Tekle, 1975).

The third Comprehensive Package Project was the Ada District Development Project (ADDP) established in 1972 by the United States Agency for International Development (USAid). The project focused on providing an integrated array of economic and farm inputs in the districts where there was potential for rapid agricultural production.

The initial plan of the Haile Selassie government was to reach the farming population through large-scale expansion of the Comprehensive Package Projects. But as early as 1970 it became clear that this approach would be too costly both financially and in manpower requirements.

Consequently, the CADU officials suggested a Minimum Package Programme (MPP) that concentrated on providing fertilizers, marketing and extension services to rural residents living along the main roads. The MPP.I was launched in 1971 to deliver fertilizers and improved varieties of cereal and the accompanying cultural practices in a package form. The grassroots contact point for these package projects was the model farmer. Each MPP area had a model farmer. Each MPP area was designed to serve about 10,000 farm families. According to the study of Tesfaye Tekle (1995) it has been estimated that 16.1 percent of the farming population of Ethiopia had by 1974 some kind of extension activity through MPP-I. In 1973 only 1.2 percent of the farmers participating in the MPP-I credit programme cultivated less than one hectare, whereas 50 percent of the total farming population in the MPP areas were in this category (MOA,1980). After the 1974 revolution, the policy adopted by the Derg Regime was to convert the comprehensive package project area into MPP centres serving larger areas.

As a result, CADU was converted into Arsi Rural Development Unit (ARDU) covering the Arsi Region. Similarly, MPP-II was launched with a road component to the MPP-I project, which was administered by the Ethiopian Road Authority. The MPP-II was designed to improve and construct additional rural roads. While MPP-I was implemented through the Model Farmer, MPP-II was implemented through the Peasant Association as the local link for the distribution of technological inputs and credit under the supervision of the Agricultural Development Bank (ADB). Unlike MPP-I, the organisation of MPP-II field offices was along administrative regions. The design of MPP-II provides for a selection of three to five farmers by a peasant association from among its members to receive technical training under development agents and subsequently act as liaison between the peasant association and Development agents and serve as demonstrators on their field. However, due to the heavy involvement of extension agents in mass organisation and other non-extension activities and limited manpower resources which were thinly spread out over a wide area with inadequate logistical support, little was achieved in terms of technology transfer (MOA, 1984).

Later on, as a follow-up on MPP-II termination, a Peasant Agricultural Development Project (PADEP) was launched by the MOA to intensify services, carry out inputs distribution, promote co-operatives, conduct improved research and promote extension linkages. To facilitate the implementation of the project, the country has been divided into eight agricultural development zones. Each zone is treated as an independent project. The extension system or method adopted is a slightly modified Training and Visit (T&V) system. The T&V system in the Ethiopian context started in the 1980s. The effort of the T&V system was to reorient research and extension services towards expanding agricultural production. The system is based on the creation of linkages between research and extension work. The key to adoption of technology is that relevant messages should be effectively communicated to farmers. What is interesting is that all these approaches have been tried at different times and places but no systematic assessment of the approaches has come up with an alternative approach for generation and diffusion of agricultural technologies. According to MOPED (1993, P.19), it is not easy to assess the impact of these projects on the nation's agricultural development, as there are many factors to impact on them. Their direct impact in raising agricultural production and productivity cannot be considered a success. According to MOPED (1993, P. 49), one of the main problems that hampered the effectiveness of the extension services has been changing the extension organizational structure and delivery strategies over the years. This has resulted in some destabilisation and has been seriously influenced by political developments.

What is to be learned from these past experiences? According to Marco Quininoes and Takele Gebre (1995), the SG-2000 project in Africa started in 1986 as a result of the severe drought of 1984 which spread famine through 20 African countries. It was the initiative of the late Ryoichi Sasakawa who enlisted the help of Norman Barlaug to seek ways of overcoming chronic food shortages in Africa. In 1985, Sasakawa and Barlaug were joined by former US President Jimmy Carter who offered to work with government leaders in Africa to create policies that would end African food problems.

As a result of this, early in 1986, SG-200 projects were established in Ghana and Sudan.

Since then the SG-2000 projects have been established in Tanzania, Benin, Togo, Nigeria, Ethiopia and Mozambique. In 1993, SG-2000 initiated a collaborative project with the TGE to increase food production through an aggressive technology transfer program. The activity starts at the regional level, through zones, woredas and spreads finally to village development centres where the selected frontline development agents are based. The regions are autonomous as a result of the positive policy of the EPRDF.

The SG-2000 program has the following objectives:

1. To assist Ethiopia's efforts to increase agricultural production through an aggressive technology transfer programme that will disseminate improve production technologies to small-scale farmers through the extension services of the Ministry of Agriculture.

2. To strengthen the capacity of the extension services for expedient dissemination of proven, research-led technologies to small-scale producers, particularly in food crops.

3. To invigorate the linkages between research and extensions in order to streamline the process of technology generation and dissemination and to provide appropriate feedback to research for technological interventions when necessary.

4. To extend through the extension services, improved grain storage and preservation technologies as well as agro-processing techniques suitable for small-scale producers.

5. To identify socio-economic and other constraints to agricultural development and to evaluate alternative means of alleviating these constraints through technological and institutional changes.

6. To offer the government of Ethiopia the capacity of the Carter Centre in fostering sound agricultural policies that can help sustain agricultural development in the country.

The SG-2000 procedures and concept are embodied in the Extension Management Training Plot (EMTP) which is conceived as a tool for training and diffusing technology and for jump-starting the farmers' capital accumulation cycle. The EMTP is where both extension agents and farmers learnt to apply the package of inputs and cultural practices that constitute the new technology and where neighbouring farmers could observe and discuss the techniques of the activity (Marco Quininoes and Takele Gebre, 1995, P. 7).

In theory, the EMTP is approximately one-half hectare in size and the demonstrations are

conducted in farmers' own plots and the management of the plots are the responsibility of the participating farmers, backstopped by the extension agent.

The EMTP program started in 1993 when 161 demonstration plots were implemented in two regions (Oromiya and Southern Regions) of the country. Since 1994, the program grew in number and covered four regions of the country (see *Table 3*).

The crops involved were maize, wheat, barley, teff and sorghum. During 1993-97 the program covered 9998 EMTPS in four regions of the country. Out of this 5568 (56 percent) were undertaken in the Oromiya region, 2823 (28 percent) in Southern Region, 461(5 percent) in Tigrai Region and 1146 (11 percent) in Amhara Region. The Oromiya region has greatly benefited in terms of the number of the EMTPs among the regions (See *Table 3*)

The table shows an increase in the number of zones, districts and villages included in each region, as well as an increase in the number of participating farmers per village. According to the guidelines the number of EMTPS per village is usually 30 to 40. The success of the approach cannot be measured only in the rate of increase of the number of EMTPs but on the number of farmers who have learned from the EMTP's participants and adopted the improved agricultural practices.

Owing to Ethiopia's diverse topography, climate and soil conditions, farmers have developed a tremendous base of food-producing seeds. Ethiopia is recognized as the centre of origin of many crops such as teff, sorghum and coffee, and the centre of diversity for many others such a wheat and barley. The package approach is basically a concept where its meaning and measures are determined by the theory and paradigm of the Green Revolution. The package is tied to purchased inputs of seed, fertilizers and pesticides.

Vandal Shiva in *Ceres* No. 154, (1995) levelled a devastating attack on the assumptions of high input agriculture, detailing its real social and environmental cost in developing countries. She argues that the Green Revolution was built on the displacement of genetic diversity. She contends that the destruction of diversity and the creation of uniformity simultaneously involve the destruction of stability and the creation of vulnerability.

Polly Stroud says the SG-2000 is attempting to transfer to Africa the promise that the Green Revolution brought to Asia in the 1960s and later to Latin America with the introduction of new high-yielding wheat and rice varieties. (Ceres No. 154, 1995). He expresses fear that the program will also resurrect several of the original Green Revolution's serious problems, which only became apparent after the initial success of the 1960s and 70s had been widely publicised. He further cites the report of a consultant from a field mission in Ethiopia who reported that the SG-2000 project in Ethiopia is an artificial laboratory. SG-2000 selects the crops and technical inputs and delivers them to the participating farmers via the village extension agent who also handles credit recovery. The packages are high-input, high-output and high-risk initiatives that create farmer dependency on imported hybrid seed and fertilizers (1995).

The SG-2000 approach makes production inputs physically available to the farmer in their second year. Participating farmers receive no credit from SG-2000. They have to reserve some income to buy their inputs. The project assumes that by the second year, the neighbouring

Table 3: Number of SG-2000 sponsored EMTPs by Region, Zone and Year

	(1993-1997)					
Region/Zone	1993	1994	1995	1996	1997	Total
1 Oromiya						
1.1 East Wellaga	20	250	481	239	104	1094
1.2 West Shoa	20	187	510	300	404	1421
1.3 East Hararghe	0	30	60	60	0	150
1.4 East Shoa	30	110	413	167	167	887
1.5 Arsi	43	140	288	147	115	733
1.6 Bale	10	100	140	122	77	449
1.7 Jimma	0	0	50	100	125	275
1.8 West Welega	-	-	45	103	61	209
1.9 N. West Shoa	-	-	70	140	140	350
Sub-Total	***123***	***817***	***2057***	***1378***	***1193***	***5568***
2 Southern Region						
2.1 Sidama	38	230	318	28	102	716
2.2 Hadiya	0	20	122	114	180	436
2.3 Gurage	0	60	135	0	0	195
2.4 Kembata	-	310	567	167	432	1476
Sub-total	***38***	***620***	***1142***	***309***	***714***	***2823***
3 Tigrai Region						
3.1 Western zone	0	20	73	0	55	148
3.2 Central	0	10	40	216	0	266
3.3 Southern	-	-	-	-	47	47
Sub-total	***0***	***30***	***113***	***216***	***102***	***461***
4 Amhara Region						
4.1 North Shoa	-	195	186	197	0	578
4.2 W. Gojam	-	-	60	-	-	60
4.3 E. Gojam	-	-	60	171	65	296
4.4 S. Wello	-	-	-	-	100	100
4.5 S. Gonder	-	-	-	-	50	50
4.6 N. Gonder	-	-	-	-	62	62
Sub-total	***0***	***195***	***306***	***368***	***277***	***1146***

Source: Compiled from various SG-2000 reports

farmers would buy their own inputs and start to copy the EMTPs either by calling on participating farmers for tips or by receiving direct advice from the frontline extension agents. At the end of the second year, first year participants are considered graduates and after the third year, all the farmers are graduates. The program moves on to a new village after three years.

The present government's enthusiasm for self-sufficiency in food has induced the Extension and Co-operative Promotion Department of the Ministry of Agriculture to run a national programme parallel to SG-2000's more limited EMTP programme. The figure set for 1995 was 36,800 EMTPs in 229 *woredas* alongside SG-2000's 3200 EMTPs in 67 *woredas*.

Following the experiences of SG-2000, Belay Ejigu states in the *Economic Focus* issue No. 2 (1997) that the New Extension System had been developed after critical assessment of the past extension systems including the recent effort by the Sasakawa Global 2000 project, which has been operational since 1995. The assessment identified the merits and demerits of each approach, the management principles of the T&V system, and merges this with the pragmatic technology diffusion obtained from the experiences of the SG-2000 project. Hence PADETES is a hybrid of the two. PADETES is Participating Demonstration and Training Extension System. The current National Extension Intervention program which was launched in 1994/95 was expanded to 10 regions and 350,000 farmers in the 1995/96 production season. The assumption is that 10 other farmers could learn from each demonstration and through the trickle-down effect, make the total number of beneficiaries rise to between 3.4 and 4 million. In addition to raising the number of the farmers, the program has also formulated a separate package tailored to moisture stress areas. In *Economic Focus* (No. 2 Volume 1, December 1997), Zenebework Tadesse questioned the newness of the extension strategy and stated that the failure of the package programs lay in the fact that it was donor-driven, fragmented and unpredictable. She further stated that the active role played by Sweden in the past had been replaced with the much broader mandate of the Sasakawa Global 2000 program. The World Bank has become the dominant player in all aspects of agricultural development. USAid is back and focusing on another region as well as trying to influence the overall food security strategy. Presently, another significant player is the European Union. Is there reason to believe that the phenomenal increase in donor participation in agricultural policy and implementation will be beneficial and or sustainable this time round?

In the past, the comprehensive package project and the minimum package programs failed to reach the vast majority of small holders. All the approaches aim at production of packages by the R & D system. The package of recommendations cover seedbed preparation, disease-resistant varieties, optimum seeding rate and sowing methods, proper fertilizer rates, methods of fertilizer application, use of pesticides, timely weeding and timely harvesting (Radical Technical Change). If all the elements are not put into use all together, expected output will not be realized. The trend of the farmers is to use elements of the package, mainly fertilizer and not all elements of the recommended packages.

For farmers who adopted the production package, fertilizers was a big investment, for the price was subsidised by 16 percent.

What is interesting is that the advocate of the package approach had its origin, not in Ethiopia but in the Western donor countries and the implementation was controlled by donor agencies. In most, if not in all, the approaches aim at the production of packages which are introduced from the centre to the periphery and which do not entail active peasant involvement in design and development but intend to promote technical changes through transfer of information and materials (i.e seeds, fertilizers, herbicides etc) usually referred to as technology transfer. This was done instead of developing the innovative capacity of the peasants for generation and diffusion of technologies and undertaking research and extension activities on

the technological needs of the farmers.

Statement of the Problem

The approach of SG-2000, which is emulated by the national extension system, emphasises the Extensions Management Training Plots (EMTP) participating farmer as the centre of diffusion where he is the source of inspiration for the surrounding farmers. The plots are regarded as a vehicle to demonstrate improved practices. The basic assumption is that 10 other farmers will learn from each EMTP through trickle down effect.

EMTPs participating farmers who participated in the first project constitute a small number. The imitators who are the majority will copy the EMTPs and, finally, the laggards will stay behind after the programme moves on to another village after three years. The participating farmers are requested to pay up to 50 percent up for the inputs they receive. This leads one to try and understand the response of peasants to these opportunities and see what goes on the EMTP.

Historical, environmental, social factors and policies explain Ethiopia's development paradox. The purpose of this study, however, is to analyse the problems in terms of two variables, technical change and peasant production, an attempt to understand the factors which affect technical change at the peasant farm level. Hence, this study seeks to examine and generate knowledge on the determinants and obstacles to the generation, diffusion and adoption of improved agricultural practices in Ethiopia.

Objectives

This study aims to contribute to an understanding of technical change and the process of technology transfer and the underlying factors which effect technical change in the peasant sector. The specific objectives of the study are to:

1. Explore the social, economic, institutional, technological constraints in adoption and the rate of adoption and the reasons for non-adoption of agricultural technologies.

2. Explore if the present approach is any different from past efforts and whether the methodology used is the most appropriate.

3. Explore the policy implications for agricultural research, extension work, technology and development.

This study will be a positive contribution to enhancing the adoption and application of modern science and technology to improve productivity in the rural agricultural sector. It is expected that the results of this study will lead not only to a better understanding of the problems of adoption of improved agricultural practices in the rural agricultural sector, but also based on the results of descriptive and analytical work the study will make recommendations on how best agricultural technologies can be generated and disseminated in the rural agricultural areas in of Ethiopia.