

**UNIVERSITY OF PRETORIA
DEPARTMENT OF AGRICULTURAL ECONOMICS, EXTENSION
AND RURAL DEVELOPMENT**

**An Assessment of Human Resource Development Program in
Mozambique's Public Extension Service
(Dissertation for the award of MSc degree in Agrarian Extension)**

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STUDENT DECLARATION

I, **Hélder Raul Gêmo**, do hereby declare that the report herein presented is the outcome of my own work, and that no such work has ever been presented to the University of Pretoria or elsewhere in application for degree or for other purposes.

DEDICATION

This work is dedicated to Igor (*Tchico*) and Junior (*Juni*), my boys and good friends.

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List of Acronyms

BR	Official Bulletin of Republic of Mozambique
DAP	Fertilizer contained Di-Ammonium-Phosphate
DDADR	District Directorate of Agriculture and Rural Development
DEA	Directorate of Agricultural Economics
DINAP	National Directorate of Livestock
DNFFB	National Directorate of Forests and Wildlife
DNDR	National Directorate of Rural Development
DNER	National Directorate of Rural Extension
DNHA	National Directorate of Agricultural Hydraulics
FA/ UCC	Faculty of Agronomy/ Catholic University of Cuamba
FAO	Food and Agriculture Organization of the UN
IAB	Agricultural College of Boane
IAC	Agricultural College of Chimoio
IFAD	International Fund for Agricultural Development
MADER	Ministry of Agriculture and Rural Development
NPK	Fertilizer contained Nitrogen-Phosphorous-Potassium
PAC	Pre-admission Course
PDARD	Provincial Directorate of Agriculture and Rural Development
PROAGRI	Agricultural National Development Program
SMS	Subject Matter Specialist
UEM	Eduardo Mondlane University
UNICEF	United Nations Organization for Children's Emergency Fund

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Any education which fails to improve our behavior
and make us better persons is defective and deficient

(Chaubey et al, 1989).

ABSTRACT

Although Mozambique independent in 1975, public agricultural extension was not established until 1987, through the institutionalization of the National Directorate of Rural Development (DNDR). Since its establishment, human resource development has been a priority. Two approaches have been adopted by DNER for the improvement of human resource over time: the first was in-service training (non-formal and formal); and the second was to replace the elementary and certificate extensionists by hiring diploma technicians on contracts.

Three evolutionary periods characterize the development of public extension in Mozambique: the establishment phase (1987-1992), the expansion stage (1993-1997), and the unified extension and PROAGRI phase (1998-2004). During each of these three phases DNER has pursued human resource development. Over the period of unified extension and PROAGRI from 1998 to 2004, DNER introduced a number of challenging goals for improving the quality of its human resources.

This study was undertaken to evaluate DNER's accomplishments in human resource development. The study addressed the role of in-service training in strengthening human resources through the acquisition of new knowledge, skills and the development of critical (analytical) thinking. This study covers only the public extension services. The data were collected during January to October 2004. Several sources of information were consulted and a questionnaire was used to collect information from DNER staff members. The survey was carried out in January and February 2004 in 33 districts of the 66 in which public extension is currently operating. A total of 260 extensionists and supervisors were interviewed out of a total of 664 field staff members.

Although human resource development and in-service training are a continuous and dynamic process, this evaluation is an overall assessment of DNER's human resource program. The study addresses training effectiveness and relevance based on the principal courses offered to the staff over time, especially during the 1999-2004 Extension Master Plan. The results of the study show that DNER achieved impressive results in the acquisition (hiring diploma staff members on contract) of new staff but the challenging goal to have in place only diplomas as frontline extension workers by 2004 was not accomplished. The upgrading plans (1999-2004) were partially accomplished but the plan of upgrading 138 certificate extensionists to diploma level was far below expectations while results on diploma and BSc upgrading were encouraging.

Low participation in-service training by staff members is also troubling. Because 35% of the sampled extensionists are still from secondary schools, special attention must be given to upgrading the knowledge and skills of those agents.

One of the most important findings of the survey was the general lack of knowledge of technical messages on land preparation, soil erosion and use of fertilizers, weeding, crop pests and diseases, livestock health information and emerging issues such as irrigation, processing and marketing. Basic information needs to be collected by agricultural economists on the economics of complex interventions such as the use of treadle pumps, conservation farming and processing. Attention should be given to upgrading the technical knowledge and skills of extension staff at all levels.

CHAPTER I.

INTRODUCTION

1.1 Background

In 1986, a year before the official creation of the Mozambique's public extension service, the Department of Rural Development (DRD) employed technicians and foremen to serve about 300,000 families in 2,227 villages. Carry (1991) reports that the rural extension services had a total of 1,100 workers: 250 were technicians with certificate and diploma level education and 850 were foremen recruited from the ranks of successful farmers. At that time, there were only a few advanced Diploma and BSc agricultural technicians scattered throughout the country. The largest number (85-90%) of extension staff comprised certificate and elementary technicians. Many of those technicians with certificate and diploma level had less than five years of field experience. The few with professional experience were from state farms, with a narrow background in commercial enterprise-based (monocultures) or in commodity extension (mainly cotton) under contract with small-scale farmers.

Currently, there are about 735 employees in public extension. About 7% have a BSc (including 1 PhD and 2 MSc), 57% have a diploma, 31% have certificate and about 5% are elementary technicians. The majority of diploma and BSc staff (at least 50%) have been recruited since 1998 under the first National Agricultural Development Program (PROAGRI). Low academic qualification and limited field experience constitute two problems to be overcome through human resource development and training programs.

Since the beginning of 1987, the training of frontline extensionists has been a priority because of the need to deal with complex farming systems and marketing problems. Since the integration of livestock and natural resources management under unified public extension (SUE) in 1998, the role of in-service training has increased. This study aims to assess the performance of in-service training, how it is perceived by the extension staff and its achievements. The main objective of this study is to determine the relevance and

effectiveness of DNER's in-service training program, as a basis for continued growth of knowledge, skills and competence of extension staff members.

1.2 Statement of the Problem

During the 1990s an average of 10 to 15% of the annual public extension budget was used for in-service staff training. This amount was increased to about 20% of the total budget of USD 24.5 million planned for the period 1999-2004. However, the current level of formal training of extensionists at the local level is not adequate to deal effectively with the various problems of different farming systems and market forces in the 66 of the 128 districts in which DNER is currently operating. In addition, the limited professional experience of the academically qualified staff constrains their ability to solve practical problems. The issues that need to be addressed in training programs for extensions workers are:

- Limited understanding of the physical and socio-economic circumstances in their local settings.
- Failure to identify problems, establish priorities and figure out how to solve them.
- Limited technical knowledge and managerial skills
- Limited capacity to interact with farmers and local leaders
- Inadequate reporting to higher levels in order to secure needed backstopping

It is of paramount importance to develop in-service training programs to overcome the above-mentioned weaknesses. This challenge was magnified with the adoption of UES in 1998 because it requires extensionists to address the entire smallholder's farming systems: natural resource management (soil, water, forests); food and cash crop field management; post-harvest and marketing problems. And since 2000, health concerns such as HIV/ AIDS and malaria have been added to the agenda of frontline extension workers.

1.3 Objectives

1.3.1 General

To assess Mozambique's public extension human resource program and to determine the role of in-service training in strengthening human resources, through the acquisition of new knowledge, skills and the development of critical (analytical) thinking.

1.3.2 Specific objectives

- To evaluate the accomplishments of training and human resource development programs for public extension staff during the first Public Extension Master Plan (1999-2004).
- To evaluate the relevance of pre-admission training courses and perceptions of the staff about the relevance of these courses.
- To evaluate the access, frequency and knowledge acquired in in-service staff training programs for extension workers.
- To recommend measures for improvement of public extension human resource development programs.

1.4 Justification

Human resource capacity building is among the key factors in developing a more responsive and effective public extension system. But experience in Mozambique shows that the flexibility in recruiting qualified extensionists is low in public extension because of many reasons. In-service training plays an important role and has been continuous and dynamic for the existing staff. However, to date there has been no evaluation of in-

service training in Mozambique's extension service. There is a need to do a periodic evaluation of the system in order to improve the subjects, contents, methods, frequency, timing and funding of future training programs. It is also important to report to the decision makers and donors about the level of expenditure and results of staff training in the public extension department. This study covers the first public Extension Master Plan (1999-2004).

1.5 Scope of Study

In Mozambique the extension system is pluralistic and it includes public, NGOs and private commodity extension. However this study is focused on public extension, which is currently operating in 66 of the 128 districts in the country. The study is designed to contribute to strengthening the effectiveness of public extension in-service training according to the priorities of public extension as a provider, coordinator and contractor (outsourcing) of services.

CHAPTER II.

LITERATURE REVIEW

2.1 Evolution of Staff and In-service Training in Agricultural Extension

Currently there are around 800,000 extension workers and hundreds of thousands of farmer technicians or lead farmers, reaching about 1,200 million people working in extension throughout the world (Feder et al, 1999). About 80% of the world's extension services are publicly funded and delivered by civil servants. Also about 95% of extension staff are working in public agricultural extension systems while 90% of extensionists in the world are operating in developing countries, with 70% of them in Asia and the Pacific (Bahal, Swanson and Farner, 1992; Feder et al, 1999).

According to Halim and Ali (1997), deficiencies in knowledge, skills and ability are common among extension personnel, particularly those in Asia, Africa and Latin America. Although staff numbers are high in many developing countries, staff quality is often low (Feder et al, 1999). For example, in Africa most frontline extension workers still have only a secondary school diploma (Bahal et al, 1992) or an agricultural diploma or certificate. One of the main internal factors affecting the success of extension is the poor educational background and experience of extension staff. In this context, in-service training is of paramount importance. Vocational training methods and their contents vary according to the approach chosen, the objectives set and the intended recipients. However, in all approaches, regular and continuous training constitutes a major challenge (Neuchâtel Group, 1999).

2.2 The Role and Importance of Staff Training

Staff training can be defined as a process of formal and informal education based on a set of dynamic objectives and expected results, towards individual and organizational effectiveness over time. Chaubey et al (1989) contend that education consists of acquiring changes in behavior by gaining desirable knowledge, attitudes, and mental and manual skills. A sound training program in extension organization is of paramount

importance for individual professional development and consequently for the improvement and effectiveness of the organization. According to Vijayaragavan and Singh (1997), the key factor in the success of extension organizations is improving their human resources. The planning and implementation of human resource improvement programs can develop more productive extension personnel. In agricultural extension, the goal of personnel development is to solve dynamic problems and to address changing circumstances over time. To fail in improving useful knowledge, attitude and skills of extension staff is a prescription for institutional failure over time.

2.3 Training Approaches

There are different approaches of training, which are related to formal and non formal education. Halim and Ali (1997) identify three approaches, namely the traditional, the experiential and performance-based (quoting Rama, Etling, & Bowen, 1993). In the traditional programs, the trainers develop the objectives, teaching techniques, assignments, lesson plans, motivation, tests and evaluation. In the experiential approach, real experiences and relevant simulated situations are incorporated into the training programs in order to stimulate the participation of trainees and influence the training process. In this model, the objectives and elements of training are jointly determined by both trainers and trainees and the trainers serve as facilitators, catalysts, or resource persons (Halim and Ali, 1997). The performance-based approach (Elam, 1971) is focused on gaining skills for job-determined tasks. The trainees are challenged to obtain needed skills to pursue defined tasks.

Both experiential and performance-based approaches are used in agricultural extension training in Mozambique. The first is common in “pre-admission” and initial in-service courses in which recent graduates (certificate, diploma and BSc) are introduced to practical situations by using real experiences and simulations. The second is fundamental throughout the professional career of extension staff. A sound professional extension career means acquiring relevant and useful technical and managerial skills over time. Van den Ban (1997) notes that an extension agent wishing to give sound advice to farmers

must understand not only the extension process but also must have adequate technical knowledge of the discipline in which he (or she) is trained.

2.4 Types of Training

Training is commonly categorized into two types: pre-service and in-service. Halim and Ali (1997) report that pre-service training is more academic in nature, provided by formal education institutions and is based in specific curricula for a defined period of time to obtain a certain academic degree or diploma. In-service training is more professional in nature and generally offered by non-formal education organizations aiming to periodically improve or develop staff knowledge and skills. However, in-service training is also offered in formal educational institutions.

2.4.1 Pre-service Training

In the pre-service training, individuals often have to attend compulsory courses according to rules established by the curricula to obtain a diploma or degree. Such training is provided by formal education institutions, which prepare future professionals for jobs such as engineering, animal or human health science, agricultural science, sociology, politics etc. Technical subject matter specialists are normally the teachers. In agriculture, there are in general two types of pre-service training programs: the (1) degree level (at least a bachelor's degree in agriculture or related field), which is usually offered for four years by universities or agricultural colleges; and (2) diploma level, which is mostly offered by the schools of agriculture for a period of two to three years beyond high school (Halim and Ali, 1997). In Mozambique the agriculture diploma courses are offered for a period of four years after 10 years of schooling while the certificate is offered for a period of three years after 8 years of schooling.

2.4.2 In-service Training

In-service training develops critical competence and skills to respond to the tasks and job responsibilities over time. Malone (1984) defines in-service training as a program designed to strengthen the competencies of extension workers while they are on the job. Halim and Ali (1997), contend that staff development improves the performance of an incumbent holding a position with assigned job responsibilities. According to the above authors, in-service training is commonly and broadly categorized into five categories:

Induction or Orientation Training: this kind of training supplements whatever pre-service training the new personnel might have had, and is given immediately after employment to introduce the new extension staff members to their positions. It begins on the first day the new employee is on the job (Rogers & Olmsted, 1957; quoted by Halim and Ali, 1997). This type of training could be compared with Mozambique's public extension "pre-admission course (PAC)". DNER has paid all of the PAC expenses and around 90% of the technicians attending the courses were then employed by DNER. Although the objective of PAC is to provide basic technical knowledge, it is also aimed at informing the participants about the philosophy, organization and functioning of DNER. After this course – which is conducted by different DNER's technicians and invited subject matter specialists from other Ministry's directorates – the new extensionists are deployed to their zones of operation.

Foundation Training: provides newly recruited people with professional knowledge about official (state) rules and regulations, financial and administrative procedures, communication and leadership skills, stakeholder coordination and collaboration and report writing. In DNER, most of these issues are included in PAC course while others are covered by supervisors during the first fortnightly (or monthly) staff training sessions in their zones of operation.

Maintenance or Refresher Training: is aimed at updating knowledge of various categories of staff members. This training deals with new technical information in

various SMS and method's courses. DNER has been emphasizing this type of training over time. Training units at provincial and central level have the responsibility to identify training needs and prioritization on an annual basis.

On-the-Job Training: is the routine scheduled training included as part of day-to-day staff activities. Generally, it is problem or technology-oriented and may include formal presentations, informal discussion, and opportunities to try out new skills and knowledge in the field. In DNER, team and networks supervisors and SMSs are responsible for providing this training on a regular basis. DNER initially gave this training every fortnight but it has been offered on a flexible basis since 1992-1993.

Career Training: is designed to upgrade knowledge and skills throughout the career of staff members. According to Halim and Ali (1997), this type of training is arranged departmentally for successful extension workers, at all levels. The DNER training program has included this type of training for many objectives. For example, in 1992 four of the seven provincial heads of public extension with diplomas were sent to India (Andhra Pradesh State) for a BSc in agricultural extension management.

2.5 The Need for Evaluation of Training Programs

In general terms, in-service training evaluation is designed to assess the extent to which an organization is effectively developing new knowledge and competence among their staff. Raab et al (1987, page 5) quoted by Halim and Ali (1987) contend that evaluation of training requires a systematic process of collecting information for and about a training activity which can then be used for guiding decision making and assessing the relevance and effectiveness of various training components. Over time, the present evaluation could be considered as a summative evaluation: although in-service training is a continuous and dynamic process, this evaluation is basically an overall assessment of DNER's training effectiveness and relevance, based on the principal courses offered to the staff over time, especially during the 1999-2004 first Extension Master Plan.

Raab et al (1987) quoted by Halim and Ali (1987) classifies evaluation by four major types namely: (1) evaluation for planning, (2) process evaluation, (3) terminal evaluation, and (4) impact evaluation. This study covers terminal and impact evaluation. In terminal evaluation the objective is to find out the effectiveness of training, to determine to what degree the desired goals were achieved and to identify eventual causes of failure. Impact evaluation assesses changes in on-the-job behavior as a result of training efforts, measuring how appropriate the training was in changing the behavior of participants in real-life situations. Terminal and impact evaluations could be compared with learning and behavior criteria: learning measures the absorbed skills and knowledge by the trainees from the training while behavior is related to the extent to which the trainees apply the acquired knowledge to real field circumstances. The general objective of this study is to assess how in-service staff training is contributing to strengthening human resource through the acquisition of new knowledge, skills and thinking (attitude).

The extensionists were asked about their participation in and access to the DNER's in-service training as well their perceptions on the relevance of the various courses offered during the last three years (2001-2003). They also responded to questions about technical and methodological topics based on the course programs and the main modules offered to them over time (and particularly in the last three years) in order to measure knowledge acquired from in-service training. For instance, in asking about their daily professional relationship with farmers (for example, problem identification and prioritization, planning, M&E, etc.) as well as their evaluation of the performance of the Unified Extension System (UES), one could assess their work attitudes and capacity for analytical thinking.

CHAPTER III. AN OVERVIEW OF MOZAMBIQUE'S AGRICULTURE AND PUBLIC EXTENSION SERVICE

3.1 Agriculture in Mozambique

The Republic of Mozambique is located on the southeast coast of Africa. The east coast on the Indian Ocean has about 2000 km of coast line and the west is bordered by South Africa, Zimbabwe and Malawi while the North is delimited by Ruvuma River, the common border with Tanzania. Divided into ten provinces and 128 districts, the country became independent in 1975.

After independence, the new government adopted a centralized model of production and marketing for all economic areas. Hundreds of state farmers and co-operatives were created in the late 1970s and early 1980s throughout the country to produce and commercialize food and cash crops production. The State Secretariats of Cotton and Cashew and Mozambique's Tea Enterprise had the responsibility to promote and coordinate the production and commercialization of respective cash crops but these organizations were abolished in the early 1990s. Smallholders were organized in "communal villages" and cooperatives, although a substantial part of them remained dispersed in rural areas. Since the middle of the 1980s, greater emphasis was addressed to smallholders. During this period, the Government decided to promote private farms and joint ventures companies (JVC) through a privatization of about two hundred state farms that ranged from 100 ha to more than 1000 ha in size.

Since national independence, agriculture has been viewed as an important socio-economic activity for development: about 80% of the total population is still directly or indirectly dependent on agriculture in rural zones. The transformation of agriculture is viewed as important in reducing rural poverty, in contributing to food security and in creating rural jobs. Agriculture contributes about 25.6 % (2003) of the Gross Domestic Product (GDP).

Due to the civil war in the 1980s and early 1990s, agriculture stagnated and Mozambique was the recipient of international food aid until 1992-1993. With the end of the armed conflict in 1992, rural people returned, rebuilt their villages and reestablished their farms. Today there are about 3.21 million small and medium sized farms (98.9%) and 360 large farms* (TIA, 2003).

The country is divided into 10 agro-ecological zones and is suitable for a number of annual food and cash crops as well as perennial fruit trees: coconut, cashew, citrus, mango and other tropical fruits.

3.2 Evolution of Mozambique's Public Extension System

Three periods characterize the development of Mozambique's Public Agricultural Extension system: 1987–1992, the period of establishment; 1993–1997, the phase of geographical expansion; 1998–2004, the stage of unified extension under PROAGRI (the National Agricultural Development Program) which pooled donor funding in a common fund mechanism.

3.2.1 The establishment stage: 1987-1992

Mozambique's public agricultural extension is one of the youngest in SubSaharan Africa. Institutionalized in 1987 within the Ministry of Agriculture (Bulletin of the Republic, March of 1987), its establishment and initial development took place between

* Small farms are those with less than 10 ha (non-irrigated) or less than 5 ha (irrigated land). Medium are those with 10 - 50 ha (non-irrigated) and above 5 - 10 ha (irrigated land). For livestock, a small farm is defined as one of having less than 5.000 poultry, 50 goats (or sheep or porks) or less than 10 cows. A medium farm has 5.000 to 10.000 of birds, 50 - 500 goats (or sheep or hogs) and 10 - 100 cows (TIA, 2003).

1987–1992. Before this time, crop campaigns (particularly for cash crops) were carried out through state farms and State Secretariats of Cotton and Cashew. Some “Integrated Rural and Agriculture Development Projects” were funded by different donors. Due to the war and prolonged drought, many Government institutions (GOs) and several international NGOs, UN agencies and some international development agencies namely Danish International Development Agency (DANIDA), Swedish International Development Agency (SIDA), Norway Development Agency (NORAD), United States Agency for International Development (USAID), etc; provided emergency (humanitarian relief) activities: food aid, free seed and agricultural hand tools, health care and education for affected people. Therefore, it was difficult to establish public extension programs in this environment of insecurity in rural zones.

Since 1989 and the early 1990s, state farms, state secretariats and some rural development projects provided pioneer’s extensionists for the National Directorate of Rural Development (DNDR). Most of them had elementary and certificate level academic training. A few donors and agencies helped DNDR at the provincial level at that time: DANIDA (through an Danish NGO called Ibis) provided financial and technical support for Tete and Zambezia provinces from 1989-90; the GTZ (German Government Organization) gave technical assistance and some logistics support from 1989 until 1999; and the UN International Children and Education Fund (UNICEF) collaborated with DNDR in Inhambane, Zambezia and Manica provinces since the early 1990s to 1996, providing some logistic support to the extension networks through the then called “integrated rural development projects” that addressed health, education, rural access and agriculture. The UN Food and Agriculture Organization (FAO), the UN Development Program and the International Fund for Agricultural Development (IFAD) played an important role at this stage as technical and financial providers to DNDR at the central level.

3.2.2 The geographical expansion period: 1993-1997

The end of war in late 1992 allowed displaced people and refugees to return to their farms. Peace created conditions for the expansion of rural and agricultural development programs, especially in the high potential zones. A large emergency program (free seed and agricultural hand tools) helped “re-launch” agriculture in rural zones. For example, in the 1993-1994 agricultural season, about 33 thousand tons of free seeds were distributed to smallholders (PESU, 1994). But the continuation of emergency situation for subsequent years, although justifiable at that time, constrained the development of private agricultural input programs in rural zones.

The World Bank became one of the most important donors assisting DNDR in 1992-1993 and it helped expand public extension throughout the country. Although the World Bank’s institutional support for DNDR was restricted to four provinces (Cabo-Delgado, Nampula, Gaza and Inhambane) and the central level, it financed the addition of 22 new extension networks from 1993 until 1997. As DNDR gained field experience, it decided in 1992-1993 to modify the T&V model by focusing its interventions on groups of farmers and allowing extension workers some flexibility in their work schedules.

3.2.3 Unified extension system (UES) and PROAGRI phase: 1998 - 2004

Public agricultural extension was unified in 1998 with the approval of the Extension Master Plan (1999-2004). The initial functioning of the UES was based on:

- Establishment of frontline extension workers as generalist technicians
- The integration of SMS (crop production, livestock, natural resource management and irrigation) at the extension network level and at the provincial and central levels.
- Joint planning, M&E of complementary activities among involved Ministry’s departments in the UES.
- Regular refresher training for staff members in need of subject knowledge

The implementation of UES was accelerated after 1999 with IFAD's support to the National Directorate of Rural Extension (DNER) and the National Directorate of Livestock (DINAP). The crop production and livestock Directorates deployed the same frontline extensionists at the local level and increased collaboration at the provincial and central levels. The National Directorate of Forests and Wildlife (DNFFB) and the National Directorate of Agricultural Hydraulics (DNHA) joined in 2001. Agro-forestry and small-scale irrigation were later added to the public extension agenda. Soil management and conservation were gradually integrated into extension in 1995-1996, starting with good practices and technology to reduce soil erosion. In 1997-1998 DNER started field demonstrations and dissemination of "zero and minimum till" technologies with the collaboration of the Sasakawa Global 2000 (Nippon Foundation and Carter Center).

**CHAPTER IV. HUMAN RESOURCE DEVELOPMENT
CHALLENGES**

Human resource development is a key issue for extension managers. DNDR (renamed as DNER since 1997) has pursued human resource development programs over time, particularly in-service staff training.

**4.1 Preparing the Initial Staff by Pre-Admission and In-service Training Programs:
1987-1992**

Poorly qualified extension workers have been a constraint on Mozambique's public agricultural extension since its inception. In 1986, a year before the official establishment of the Public Agricultural Extension Services, the Department of Rural Development (DRD), within the Ministry of Agriculture, employed technicians and foremen to serve about 300,000 families in 2,227 villages. Carr (1991) reports that DRD had a total of 1,100 agents. Of these, 250 were technicians with a certificate and some with diploma level education and 850 were foremen recruited from the ranks of successful farmers. The majority of foremen had worked on state farms, agriculture cooperatives or agricultural and rural development projects. Once selected as extension agents, the foremen received practical training to act as diffusers of basic technical knowledge and improved production practices. Gonçalves (1992) reports that each foreman was responsible for at least one village with about 300 – 400 small-scale producers.

The 1987 to 1992 period constitutes the first phase of public extension. DNDR's first "pre-admission extension" course for 71 agents was offered in November 1987 and 18 extension networks were established. Almost all extension networks were located in districts close to or in the provincial's capitals because the civil war was destabilizing rural areas. Since the extensionist's work time was reduced to 4-5 hours per day, because of security reasons, in-service staff training was confined to the management of basic food crops and horticulture in some zones.

The “pre-admission course”, the T&V system and the management of basic food crops were topics which extension agents were expected to know. The “pre-admission course”, for technicians with a minimum of a certificate, takes about two months. Gonçalves (1992) defines field extensionists as multipurpose technicians with a minimum of a *certificate* and graduation from a “pre-admission training” offered by the Ministry of Agriculture. The following job categories were defined for field workers: field extensionist, subject matter specialist, extension supervisor (at network level) and subject matter supervisor (provincial).

4.2 Defining and Implementing Priority Courses and Content: 1987-1992

From 1989 to 92, between 10% and 20% of DNDR’s annual budget was allocated to in-service training.

Pre-admission course (PAC): comprises a 60 day course covering basic theoretical knowledge of the philosophy, guiding principles, objectives, organizational structure and functions of public agriculture extension, extension models and methods, including practical training in rapid and participatory rural appraisals (RRA and PRA). From 80 to 90 percent of the “graduates” of the pre-admission courses were subsequently employed by DNDR. From the beginning of public extension and PACs, special emphasis was given to guiding principles which stress the adoption of a problem-solving approach to extension (reactive extension); and the importance of farmer participation in the formulation, implementation and evaluation of extension programs (programmed extension). Gonçalves (1992) has enumerated these guiding principles:

- Need to be based on rural reality, that is, starting from the knowledge of concrete situations;
- Need to be compatible with the economic, cultural and technical levels of the target population;
- Need to involve the target group as active participants in their development;
- Need to start with the problems and priorities of the target group;

- Need to have concrete objectives and systematic evaluation of results; and
- Need to be flexible and have an educational character.

The T&V extension model was an important part of PAC's in terms of organizational structure, hierarchical interaction and reporting. RRA and PRA practical exercises comprised jobs for trainees (future extension workers) in one to two villages.

Agronomic technical modules were included as part of PACs and subsequent *refresher courses*. They focused on improved management of basic food crops and horticulture based on good agronomic practices. The courses included basic food crops: maize (*Zea mays L.*), paddy rice (*Oryza sativa*), sorghum (*Sorghum bicolor*), cow pea (*Vigna unguiculata*), butter beans (*Phaseolus vulgaris*), ground nut (*Arachis hypogea*), cassava (*Manihot esculenta*) and sweet potato (*Ipomea batatas*). Technical messages emphasized:

- Recommended seeding period;
- Spacing for different crops (in monoculture);
- Thinning 1 to 2 plants per hole;
- Timely weeding;
- Appropriate time of harvesting and grain drying
- Use of locally made organic insecticides for grain and seed conservation; and
- Rotation or intercropping with specific cereals and legumes that can improve soil fertility.

4.3 Changing Approaches and Increasing Subject Matter Content in In-service Training: 1993-1997

The second or expansion phase of extension from 1993 to 1997 introduced additional subject matter in-service staff training programs. First, the T&V system was modified in the 1992-1993 agricultural season to be more flexible in terms of the extensionist's agenda and to focus on farmer groups, instead of contact farmers. Second, external inputs (technological packages) became part of the technical messages since 1995; third, post-

harvest issues grew in importance for extension agents. Therefore, in-service training was expanded to include:

- Group dynamics and farmers organizations
- Soil conservation (against erosion) and basic notions of soil fertility
- Post-harvest issues such as timing of harvest, grain drying and improved cellars for grain conservation to reduce the high post-harvest losses of about 30% in rural zones among small holders (Yachan, 1997; Siteo, 2001).

The duration of PACs continued to be around 60 days. However, the number of *refresher* courses increased over time to provide extension agents with new knowledge and skills.

Two new guiding principles were added during the expansion period: first, the need to take into consideration the role of complementary institutions such as agricultural research and education, NGOs and farmers organizations; second, decentralization of extension's networks management to the provinces (SPERs). These new principles required more training in planning, M&E, communication, group dynamics and farmers organizations, at the provincial level.

The provision of World Bank funding in 1992-1993 for DNDR's second phase (1993-1997) allowed some qualified technicians (BSc) to be hired on contracts at the provincial (Cabo-Delgado, Nampula, Inhambane and Gaza) and at central levels. However, the stock of human resources continued to be weak academically.

4.4 Adding New Challenges in Staff Training and Expanding Human Resource Goals: 1998-2003

The third phase of the growth of DNER (1998-2003) devoted increased attention to human resource development. Three approaches were used. First, technicians with

diplomas in agriculture and livestock were hired on annual contracts to replace certificate level extension workers. Second, staff training (formal and non formal) was strengthened. Third, subject matter specialists (SMS) in crop production, livestock and natural resources management were hired at the district, provincial and central levels to work closely with DNER to implement the Unified Extension System (UES).

4.4.1 New institutional approaches and new training challenges

Bagchee (1994) contends that unified extension has one over-reaching goal of integrating crop production, livestock and agro-forestry extension into a single force at the field level. The institutional approach of UES was adopted by the Ministry of Agriculture and Fisheries in 1998, and it increased DNER's capacity to deliver new knowledge that was needed by extension workers. During the two first extension phases (1987-1997) emphasis was placed on basic food and some cash crops, such as sunflower and paprika. However, in the third phase, the training challenge was broadened to include natural resource management (soil, water and agro-forestry); food and cash crop production; livestock extension (animal health, small-scale animal infrastructures, animal reproduction and nutrition); fish culture and bee keeping; farmers associations and agro-business; and HIV/ AIDS and malaria (since 2000).

The need for strong linkages between DNER and the National Directorates of Livestock (DINAP) and Forests (DNFFB) as well as agricultural research institutions (agronomic, animal production and animal health); required more staff training at the central, provincial and district levels. There was a need to:

- Train SMSs in basic knowledge (philosophy, guiding principles, extension objectives and goals, models and methods) of extension
- Train both SMSs in crop production, livestock, agro-forestry and natural resource management, the extension managers and field supervisors in joint planning, implementation and coordination activities and M&E.

- Train more than six hundred extension workers and field supervisors in new subject matter areas such as crop production, livestock, and natural resource management (soil, water and forestry), although irrigation had been the weaker area in UES.

The field extension worker was a frontline technician, ideally with a diploma, working in a holistic manner within the farming systems of their zones of operation and backstopped by SMSs at network, at provincial (PSREs) and central levels (EMP, 1998).

4.4.2 Strengthening human resources

In 1999, 6% of the 645 technicians in Mozambique's public extension service had a BSc degree (almost all in agronomy), 50% had a diploma (mainly in agriculture), 37% had a certificate, and 7% elementary training (two years of elementary agriculture school after five years of primary school). The provinces of Nampula, Cabo-Delgado, Tete, Manica and Sofala had less educated extension agents with about 50 to 80% at certificate and elementary levels. Table 4.1 displays the stock of human resources in public extension in 1999.

Table 4.1 Public extension human resources, 1999

Provinces and Central level	BSc	Diploma	Certificate	Elementary	Total
DNER (central)	15	7	0	0	22
Maputo	2	22	7	0	31
Gaza	2	64	0	0	66
Ibane	2	39	0	0	41
Sofala	3	18	7	10	38
Manica	1	50	22	2	75
Tete	2	13	24	10	49
Zambezia	1	24	8	1	34
Nampula	5	33	90	7	135
C. Delgado	2	33	66	0	101
Niassa	2	21	13	17	53
Total	37	324	237	47	645

Source: Department of Planning, M&E (DNER, 1999).

According to Halim and Ali (1997), academic training increases the knowledge, ability and capacity of extension workers in general and prepares them for greater responsibility and higher positions in the organization. Malone (1984) argues that extension organizations should encourage extension agents to pursue academic training because technicians and managers will derive job satisfaction, enhance stability of employment and increase their effectiveness and the efficiency of the organization. Staff training and human resource development comprised plans for upgrading 138 certificate extension workers to diploma level, 13 diploma extensionists to BSc and 9 BSc agents to MSc over the 1999-2004 period.

In 1999 DNER established the diploma level as the minimum acceptable level for extension workers (EMP, 1998) and it was expected by 2004 to have only diploma extension workers employed by the public extension service by replacing or upgrading all certificate and elementary extension agents. Table 4.2 shows the number of certificate extension agents planned to be sent for upgrading to diploma level by province over 1999-2004. Two types of scholarships were planned. The first was for annually contracted staff, who lacked access to government support for formal training due to institutional regulations. Therefore, after upgrading, they were obligated to reimburse the Ministry for the amount of money spent on their training. The second was free scholarships for civil servants in public extension.

Table 4.2 Certificate extensionists (C exts) for upgrading to diploma, 1999-2004

Items	Provinces										Total
	MPT	GZA	INB	MNC	SFL	TET	ZMB	NPL	CDL	NSS	
Existing C exts	21	24	44	36	0	0	28	115	59	15	342
C exts by borrowing scholarships (20%)	4	5	9	7	0	0	6	22	12	3	68
C exts normal scholarships	1	0	0	0	33	16	5	11	0	4	70
Total Cexts to be upgraded	5	5	9	7	33	16	11	33	12	7	138

Source: DNER's Extension Master Plan, 1999-2004. Training program, annex 5

A phased plan was designed to cover three years (1999-2001) for the formal training of certificate extensionists by province per year (Table 4.3). The selection of certificate extension workers to benefit from the scholarships was based on good professional performance and those less than 35 years of age.

Tab 4.3 Formal training sequence for certificate extensionists by province per year, 1999-2001

Years	Provinces										Total
	MPT	GZA	INB	MNC	SFL	TET	ZMB	NPL	CDL	NSS	
Yr I (99)	1	0	0	0	15	8	5	11	0	2	42
Yr II (00)	5	5	9	7	10	8	5	11	6	4	70
Yr III (01)	0	0	0	0	7	0	1	11	6	1	26
Total	6	5	9	7	32	16	11	33	12	7	138

Source: DNER's Extension Master Plan (1999-2004). Training program, annex 5

4.4.3 Financing academic upgrading of extension staff

The formal staff training was financed by three types of expenditures: scholarships for extension workers, payments of 75% of salaries while studying, and hiring extensionists on contracts to replace staff on study leave. The level of payment was the same for the three levels of extension staff to be upgraded: certificate, diploma and BSc. The payment of 75% of salary was in line with Mozambique's regulations for civil servants (students-workers) studying on a full time basis. The payments included a bonus for the 13th month each year. Contracting out extension workers to replace those studying was designed to reduce disruption because of the absence of "student-workers"

For a certificate upgrading to diploma, the unit scholarship's cost was estimated at USD 600 per year. The 75% of annual salary was about USD 800 while contracting out cost USD 1950 per year. The total unit costs to upgrade one certificate extensionist was about USD 13.400, or around USD 1.849.200 over four years of agricultural training for the proposed 138 certificate extensionists studying to become diploma agents. Adding annual transport costs, related administrative costs and contingencies increased the total to USD 1.9 million (~ 39 % of the total training budget for 1999-2004). According to the plan, 30

%, 52 % and 19 % of the USD 1.9 million, respectively, were necessary for the first (1999), second (2000) and third (2001) years of the program.

The unit scholarship's cost of upgrading a diploma level extension worker to a BSc level was estimated to be USD 10,000 (tuition, accommodation and living expenses), at local institutions. Adding 75% of their salaries while studying (about USD 3,350 per year) and a full salary for a BSc contracted out technicians (around USD 4,550 per year), to replace those 13 on study leave, the unit cost of training was estimated at about USD 89,500 for five years, the required period to earn a BSc in Mozambique's higher education (including thesis), at the time. The direct cost was about USD 1,163,500 but after including indirect costs, the total cost was USD 1,200,500 (~24 % of the total training budget).

The unit cost for a MSc degree was estimated at USD 20,000 for training outside Mozambique. The payment of 2 years of 75% salary of the 9 BSc extension agents during their studies was around USD 60,300 while replacing them with BSc technicians on contracts for two years (about USD 81,900), increased the direct cost to approximately USD 322,200. Adding the indirect costs, the total cost was estimated to be USD 350,000 (~ 7 % of the total budget).

To summarize, formal training was planned to absorb about 70% of the total budget for staff training program in public extension during 1999-2004 as follows: 39% to upgrading certificate staff; 24% for diploma extension workers and 7% to the BSc technicians for MSc training.

4.4.4. Replacing certificate agents by hiring extensionists with diplomas on contracts

In addition to academic upgrading, DNER planned to hire diploma level extensionists on contracts (from agricultural schools) to replace certificate extensionists. Two diploma level agricultural schools are operating in the country: the "Instituto Médio Agrário de

Chimoio, IAC” (Agricultural Institute of Chimoio) and “Instituto Médio Agrário de Boane, IAB” (Agricultural Institute of Boane). While the IAC (Manica Province) was established before independence in 1975, the IAB (Maputo Province) was founded in 1986 by the Ministry of Agriculture and then transferred to the Ministry of Education in 1990, which currently oversees all agricultural schools. Both institutes offer four-year diploma courses. IAB has one agricultural course, which combines crop production, livestock and natural resource management. The IAC has three courses: agriculture and livestock, forests, and wildlife (since year 2000) courses. Table 4.4 shows the total number of graduated students from both institutions from 1998 – 2003.

Table 4.4 Number of students graduated from the IAC and IAB, 1997 – 2004

Institutions	Courses	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	TOTAL
IAC	Ag. & Lv	26	33	38	33	46	40	59	38	313
	Forest	10	8	19	11	15	8	10	8	89
	Wildlife	0	0	0	0	0	0	14	0	14
	Su total	36	41	57	44	61	48	83	46	416
IAB	Ag. & Lv	38	37	35	32	45	58	49	32	326
	Sub total	38	37	35	32	45	58	49	32	326
TOTAL		74	78	92	76	106	106	132	78	742

Legend: Ag & Lv – agriculture and livestock

Source: IAC and IAB (August, 2004)

Since 2001-2002 the IAB started to graduate students twice a year. According to DNER’s plan to replace certificate extensionists, a total of 409 diploma staff were projected to be working in DNER in 1999, 620 diploma extensionists in year 2000 and a total of 782 extension agents in year 2001. Table 4.5 indicates the replacement plan of certificate by diploma extensionists in the ten provinces.

Table 4.5 The plan to replace certificate by diploma (contracting out) extension workers per province and year, 1999-2001

Years	Provinces										Total
	MPT	GZA	INB	MNC	SFL	TET	ZMB	NPL	CDL	NSS	
Yr I (99)	22	65	31	25	40	29	76	69	20	32	409
Yr II (00)	15	15	27	22	10	8	16	58	30	10	211
Yr III (01)	9	9	17	14	8	0	12	57	29	7	162
Total	46	89	75	61	58	37	104	184	79	49	782

Source: DNER’s Extension Master Plan

Comparing the DNER's human resources diploma's needs from year 1999 to year 2001 reveals a shortage of available technicians. For example, from the 409 needed in 1999 there were already 324 in public extension resulting in a deficit of 85. In 1999, the two agricultural institutes only graduated 78 technicians. In years 2000 and 2001, the needs were 211 and 162, respectively, and the total number of students who were graduated was 92 and 76. Since 67 international and national NGOs were working in extension and rural development projects in 1998 (DNER's M&E survey, 1998) and paying better salaries and providing better incentives (transport, housing and medical benefits) than DNER, it is obvious why DNER found it difficult to hire new diploma staff on contracts.

4.4.5 The total cost of human resources development

In summary, two approaches were developed to pursue human resource improvement in public extension. The first was to prioritize in-service training and the second was to hire diploma staff on contracts to replace agents with certificates. DNER's staff development program included formal (upgrading) and non-formal (short term training) to increase the competence of staff over time (EMP, 1998). The total cost of staff training and human resource development was estimated at USD 5.148,2 million, 20% of the total DNER budget of USD 24,560 million during DNER's Extension Master Plan. Formal training was to be done in national and foreign (especially for MSc degree programs) institutions. The non-formal training was to be done internally by public extension's SMSs or invited experts using the Agricultural Training Centers in the provinces and through private training firms and agricultural faculties.

CHAPTER V. SURVEY METHODS AND AREA OF STUDY

5.1 Research Design

This training assessment is the first study of its kind since the beginning of public extension in 1987. The study covers 1999-2004 when public extension was guided by the first Extension Master Plan and implemented under PROAGRI I. This study began with a review of the literature, followed by the development of survey methodology, data collection and analysis and producing recommendations to improve the effectiveness of in-service extension staff training.

Box 5.1 Calendar of events in carrying out an assessment of DNER’s training program

Serial No.	Steps
1	Review of the literature on extension training
2	Review of the in-service training and DNER’s human resource programme
3	Review of training information about PSREs, 1998-2003
4	Review of information at DNER central level, 1998-2003
5	Summary of the content in various technical and extension modules of the in-service training courses
6	Interviews with academic and training institutions
7	Elaboration and pre-test (Maputo SPER staff) of the questionnaire
8	Interview extension frontline staff in the field
9	Data processing, analysis and write-up of results

Public extension was started in 1987 with 71 new extensionists and it now employs 664 frontline extensionists (out of a total of 735 staff) in 2004. Beside the compulsory "pre-admission" courses, hundreds of other courses were given over time throughout the rural zones of extension. The content of the "pre-admission" courses as well as the content of the principal technical and methodological courses were used to prepare the questionnaire. The content of the courses was used to determine how much the staff knew about extension principles, concepts, models and methods, approaches and technical knowledge.

5.2 Sampling Procedures

Thirty three districts were chosen and divided into three different groups according to the age of the networks as well as the representativeness of public extension throughout the country. The three groups represented the three evolutionary phases of public extension. The first comprised the extension networks created during the establishment period (1987-1992) of public extension. The second was the expansion period (1993-1997) and the third covered the recent extension networks formed under unified extension from 1998-2004. A total of 260 DNER's extensionists were interviewed in late January and early February of 2004, which comprised about 30% of DNER's total staff. The provincial samples included networks established in each of the three different phases of the growth of DNER. The selected networks in each province comprised one or two networks formed at an early stage of each of the three phases to ensure that the sample included experienced and trained staff over time. To ensure representativeness, districts were selected in all ten provinces.

5.3 Data Collection

Central and provincial (PSRE) quarterly and annual reports were used as sources of data for both formal and non formal staff training over time. The Extension Master Plan (1999-2003) was the main source of information on formal training plans. Annual reports were studied for data about program implementation in the ten provinces (PSREs) during the period of study. All collected information was then checked with the human resources departments of the Provincial Directorates of Agriculture and Rural Development (PDARDs). Finally, the provincial director of agriculture confirmed and approved the information.

For non-formal training, a pre-tested and validated questionnaire was used to evaluate acquired knowledge and new thinking of staff members (annex 1). The questionnaire included both closed and open-ended questions. It had three different parts: *first*, general information about the respondents; *second*, staff participation in the compulsory "pre-

admission course”, staff access to in-service training and their perceptions about its relevance; and *third*, technical and extension knowledge, including extension philosophy, guiding principles, models, farmers participation, priorities, planning and M&E, etc. The technical knowledge focused on land preparation, soil conservation, fertilizer, planting, weed control, pests and diseases and post-harvest issues. In livestock, emphasis was placed on animal health for cows, goats and poultry. In agro-forestry extension, the questions focused on campaigns against bush fires, reforestation and beekeeping.

Data collection was deliberately carried out without notifying the extension staff in advance about the content of the questionnaire. The extensionists were invited to the 33 participating District Directorates of Agriculture and Rural Development (DDADRs) and asked to fill out a job questionnaire. All 33 districts were covered within a period of two weeks in order to avoid an exchange of information on the content of the questionnaire between different extension networks. Six technicians from the central level of DNER were involved in the data collection. The questionnaire was answered by all extensionists in each extension network, at the same group session. Before filling out the questionnaire, the extension staff members were informed that the study was designed to evaluate the level of knowledge, understanding and opinions of the extension networks as a result of the DNER training programs.

5.4 Data Processing

Excell and SPSS were used for processing and analyzing the data.

5.5 Sample distribution and characteristics

The sample included 260 extension workers (n=260) out of a total frontline staff of 664 (including supervisors). Four provinces had the highest number of interviewed extensionists: Cabo-DeIgado (42 extensionists, 16%), Nampula (30 extensionists, 12%), Gaza (26 extensionists, 10%) and Manica and Maputo who had the same number of 25 extensionists (~10%). Zambezia had a small sample of 17 (~7%) because it had a smaller number of extension workers during the interview period. With the exception of Nampula, because of heavy rains during the interviews, the sample distribution is directly proportional to the existing provincial extension staff. Figure 5.1 illustrates the sample distribution by province.

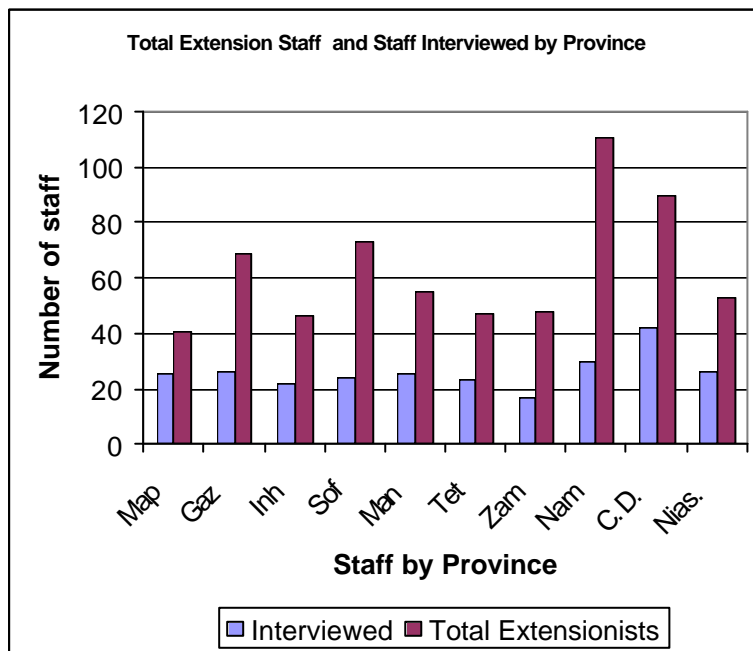


Figure 5.1 Total extension staff and staff interviewed by province

The sample was defined to cover the three different stages of extension in a balanced manner. In this context and from the total sample, there are 92 (35.4%) interviewed agents from extension networks between 1987-1992 (establishment period), 80 (30.8%) extensionists working in networks established between 1993-1997 (geographic expansion

stage) and 88 (33.8%) from networks created during 1998-2003 (unified extension phase). From the sample, 236 extension's workers (90.8%) are men and 24 are women (9.2%).

5.6 Area (districts) of Study

The sample included extensionists who were working in 33 of the 66 districts in which public extension was working (Box 6.1). Each province included three districts with the exception of Nampula, Inhambane and Tete, which included four districts each. Nampula has the most public agricultural extension (10 networks) while Inhambane and Tete had one network each covering two districts: Panda and Homoine; and Angonia and Tsangano, respectively (Annex 2: sampled districts throughout the country – Map of Mozambique).

Box 6.1 List of sampled districts by province

Provinces	Districts	Provinces	Districts
1. Maputo	Moamba Boane Matutuine	6. Tete	Angonia Tsangano Changara Cabora-Bossa
2. Gaza	Chokwe Bilene Chibuto	7. Zambezia	Nicoadala Namacurra Alto Mulocue
3. Inhambane	Homoine Panda Massinga Inharrime	8. Cabo-Delgado	Montepuez Balama Chiure
4. Sofala	Nhamatanda Gorongosa Dondo	9. Nampula	Angoche Ribawe Monapo Rapale
5. Manica	Manica Sussundenga Gondola	10. Niassa	Sanga Lichinga Majune

Provinces 1 – 3 represent the south region of the country. In general the climate is less suitable for rain fed agriculture: annual rainfall varies between 400 – 1000 mm (Inharrime and Bilene-Macia districts) per year; altitude is between from sea level up to 200 m to 500 m; soil fertility is generally poor although there are some wetland areas with a high percentage of organic material. Provinces 4 – 7 comprise the center region where the climate is relatively favorable for rain fed agriculture: annual rainfall varies from 400 – 1600 mm (Gurué and Milange districts) while altitude varies between 200 – 1500 m (Chifunde, Marávia and Zumbu districts). Province 8 – 10 constitutes the north region of the country. In general, this is the most favorable zone for rainfed agriculture especially the hinter land and upland zones: annual rainfall varies between 500 and 1400 mm (Lichinga and Sanga districts) and altitude reaches 1000 m (Mueda e Muidumbe districts).

CHAPTER VI. RESULTS AND DISCUSSION

This chapter is divided into two sub-chapters that report the results of formal and non formal training from 1999 to 2004.

6.1 Formal Staff Training: Expectations and Achievements

It was planned to upgrade 138 certificate, 13 diploma and 9 BSc extension agents during 1999 to 2004. However, it was only possible to secure scholarships for thirteen certificate level agents at provincial level, 7 diplomas at central DNER, twenty diplomas at provincial level, and five BSc at the central level to become MSc staff members.

6.1.1 Certificate upgrading

The results of certificate upgrading were modest compared with the planned targets. Table 6.1 presents the training plan for 1999 to 2001 and the number of upgraded certificate frontline extension workers by province and by year. The first column of numbers under each province represents the target and the second is the number upgraded.

Table 6.1 Training plan and number of certificate staff upgraded by province and by year, 1999-2001

Years	Provinces										Total
	MPT	GZA*	INB	MNC	SFL	TET	ZMB	NPL	CDL	NSS	
Yr I (99)	1 – 1	0	0 – 1	0	14	8	5	11	0	2	41
Yr II (00)	5	5	9 – 2	7 – 3	10	8	5	11	6	4 – 4	70
Yr III (01)	0 – 1	0	0	0	8	0	1	11	6	1	27
Total	6 – 2	5	9 – 3	7 – 3	32	16	11	33	12	7 – 4	138

Source: PSRE's (PDARDs) annual reports

*Gaza Province replaced all certificate level agents with diplomas holders in 1998

Only about 10% of the planned number of certificate extension workers were upgraded. One of the main constraints was a limited budget allocated to extension by the Provincial Directorates of Agriculture and Rural Development (PDARDs). Also, since the beginning

of public extension, it has been difficult to get donors and UN agencies to support formal staff training. Since 2001, a common mechanism of funding PROAGRI was approved by the Ministry of Agriculture and endorsed by donors. Under this mechanism, extension became one of the eight components under the jurisdiction of PROAGRI, instead of donors allocating funds for extension at the central and provincial levels. Therefore, central and provincial extension services had “to compete” with seven other institutions and activities for funding from PROAGRI. Most of extension’s limited budget under PROAGRI has been allocated for other priority items, especially salaries, transport, equipment, and for operational costs, including non-formal staff training. As a result, funding for formal staff training fell short of the targets.

In addition to financial constraints, Ministry of Agriculture and Rural Development (MADER) new training regulations in 2001 reduced the number of scholarships for contract staff which represented about 70% of the total number of extension workers. Also, since most of the certificate civil servants were more than 40 years of age, they were not eligible for MADER’s upgrading. Also, most extensionists lived in community houses and about 20% in government houses (DNER’s survey, 2004). Although many extensionists wanted to pursue training, they remained at home because they did not want to give up their houses. Finally, many in MADER’s headquarters and at the PDARD level argued that it was cheaper to hire diploma technicians on contract rather than upgrade certificate extension workers. They argued that four years of diploma training and paying two salaries (“student-worker” and “replacer-extension worker”) was expensive and time-consuming. These factors explain why it became difficult to implement formal training, and achieve a goal of upgrading 138 certificate extensionists to the diploma level in five years.

6.1.2 Diploma upgrading

The target for upgrading staff with diplomas was exceeded. A total of 13 were planned and 27 workers secured access to BSc training. Also the budget was not overspent because DNER helped three technicians at the central level and one at the provincial level

secure BSc scholarships to study at Cape Coast University in Ghana, through an international NGO (Sasakawa Global 2000). Also, three of the seven upgraded in the central office only had to pay fees, thus reducing the cost of a BSc from USD 10.000 to about USD 2.000 per student. The two from Niassa Province were funded by IFAD (out of the MADER's budget) through the Agricultural Development Program for Niassa. Also, none of the seven upgraded at the central level was replaced with temporary staff during the period of study. At the provincial level, only six of the twenty were replaced during the study period.

The establishment of a faculty of agronomy at Cuamba University (Niassa Province) in 1999 enabled a few diploma technicians to study at Cuamba. Fourteen of the twenty extension workers from the provincial level who pursued a BSc did (or are still doing) it at Cuamba University.

6.1.3 BSc upgrading

Five of the nine planned extensionists had access to the following MSc courses: agricultural economics (1), agricultural management (1), management of natural resources (1), rural development (1) and agrarian extension (1). Two of the five extension workers were funded by DNER while the others secured scholarships through organizations such as SG 2000 and ICRAF. But, staff turnover is high, particularly for experienced diploma, BSc and recent MSc extension workers. Turnover is attributed to better job opportunities in and outside of MADER. While the monthly salary in the public extension system is about USD 600, competent staff with a MSc degree can earn three to five times more in international NGOs and development organizations.

The failure to meet the target to train 9 at the MSc level was caused by a lack of vision of the critical role of human capital development for a career in extension. As a result, less priority was given to formal training in budget allocation at the provincial level. Also, the "hired on contract status" of many of the few BScs at provincial level and the turnover contributed to an unwillingness to send BSc extension workers for upgrading from the

PDARDs. For example, because of turnover, DNER had no BSc technicians in Tete during 2001-2003, none in Zambezia in 2002 to the middle of 2003, and none in Inhambane province between 2001-2004.

6.2 Contracting for Human Capital Improvement

The data reveal that modest progress has been made in developing human capital from 1999-2004. A major human resource goal for public extension during 1999-2004 was to have only diploma technicians in place as frontline extension workers by 2004. However, this challenge was not accomplished. But table 6.2 shows that some progress has been made.

Table 6.2 Mozambique: total stock of human capital in public extension, 1996, 1999 and 2004.

Provinces and central DNER	BSc			Diploma			Certificate			Elementary		
	96	99	04	96	99	04	96	99	04	96	99	04
Central DNER	9	15	18 b)	6	7	3	1	0	0	0	0	0
Maputo	1	2	2	8	22	43	23	7	5	7	0	0
Gaza	2	2	3 a)	40	64	71	24	0	0	2	0	0
Inhambane	0	2	0	31	39	52	73	0	2	4	0	0
Sofala	2	3	8	5	18	51	25	7	21	16	10	6
Manica	1	1	3 a)	27	50	43	35	22	15	1	2	1
Tete	1 c)	2 c)	3 a)	2	13	27	14	24	19	6	10	8
Zambezia	0	1	2	11	24	43	38	8	10	8	1	0
Nampula	3	5	3 a)	40	33	35	132	90	75	19	7	7
C. Delgado	2	2	2	22	33	33	79	66	63	2	0	0
Niassa	1	2	4	0	21	21	29	13	17	24	17	16
Total	22	37	48	192	324	422	473	237	227	89	47	38
% (96-99-04)	100	168	218	100	162	212	100	49	47	100	53	43
% (PROAGRI)		100	129		100	130		100	96		100	80

Sources: DNER (P, M&A) and SPERs quarterly and annual reports.

Legend: a) The number includes 1 agricultural extension senior adviser contracted through IFAD (03-04) working in PSRE.

b) The number includes 1 agronomist PhD, 3 senior professionals: 1 veterinary, 1 agronomist and 1 economist contracted for 4 different projects implemented by DNER and 2 MSc of DNER (civil servants).

c) The number includes resident international technical assistance by 1 senior agricultural extension adviser contracted through DANIDA.

6.2.1 BSc staff development

Table 6.2 shows the change in human resources from 1996 to 2004. DNER's central office had doubled the number of BSc from 9 to 18 (including one PhD and 2 MSc). However, many BSc technicians at the central level are "gaining experience and skills" in extension. But, as discussed, staff turnover is undermining the growth in human capital. Four Mozambicans with BSc degree and three with MSc degree who were employed at DNDR's central office in late 1980s left the institution between 1992-1993 for new jobs within and outside of the Ministry of Agriculture. Between 1993-1997, four experienced BScs left DNER for the same reasons. During 1998-2004, five other BScs opted for new jobs within MADER and international development agencies. Confronting a high turnover, DNER contracted new extension staff over time and trained them.

At the provincial level, Nampula benefited from World Bank support from 1992 to 1998 and hired a relatively large number of BScs on contract. Cabo-Delgado, Gaza and Inhambane provinces also received World Bank support. From 1998-2000, the provinces of Manica, Tete, Nampula and Gaza benefited from direct IFAD's support. Currently and through PROAGRI, IFAD is funding the salaries of four senior extension advisers (one per province) for a period of three years (2002-2004). Between 1999-2004, Niassa province doubled the number of BScs while the number at Sofala increased from two to eight. To summarize, the total number of BSc's in DNER increased 29% from 1999 to 2004, that is, from 37 to 48 technicians. The 48 extensionists represent an increase of 118% over the number of BSc staff in DNER in 1996.

6.2.2 Increasing diploma staff

Between 1999 and 2004 the number of diploma extension workers increased from 324 to 422. Although below target, this is an impressive achievement in five years. Six provinces currently have at least 50% of staff with diplomas namely: Gaza (100%), Inhambane (95%), Sofala (~90%), Zambézia (77%), Manica (63%) and Sofala (~50%). The south region has the most qualified extensionists followed by the center region while the north

region has less qualified extension human resources. Many technicians graduated in IAB (south region) have opted for job opportunities in the south region and the same is happening in the center region where IAC is located.

Gaza replaced all certificate with diploma level extensionists in 1998 with support from the World Bank. The Mozambican and Bank project co-funded 90% of the cost of the “pre-admission course” of new diploma staff (24), motorcycles, field equipment and initial operational costs. In 1998 Inhambane contracted eight new diploma extensionists and retired or indemnified 73 certificate and four elementary extensionists. In 2003, Inhambane hired 13 diploma extensionists for new extension networks covering Inharrime and Jangamo districts. Sofala increased the number of new diploma staff from 18 in 1999 to 52 in 2004 and created new networks in 5 districts. Manica almost doubled the size of its diploma staff from 27 to 50 during 1994-1999. However, deaths related to HIV/AIDS and staff promotion reduced the number to 43 in 2004. Maputo and Zambezia increased the size of their diploma staff about 90% during 1999-2004 period: 22 to 43 and 24 to 43, respectively. Maputo created new extension networks in 2002 in Moamba and Magude districts, while Zambézia province established two new networks in 2004 in Ile and Pebane districts and reinforced Mocuba district. By contrast, high potential agriculture provinces such as Nampula, Cabo-Delgado and Niassa, currently have a low percentage of diploma extension workers. These three provinces have spent little effort on human development over time. Most of the existing certificate staff have worked for DNER since the beginning of public extension in the late 1980s and early 1990s.

6.2.3 Reducing the number of certificate extension workers

The first master plan aimed to have all certificate extension workers replaced by or upgraded to diploma extensionists by 2004. However, there are currently 227 certificate agents in DNER. While the 477 in 1994 were cut to 237 in 1999 (51% reduction), only 10 (5%) extensionists have been reduced during the PROAGRI phase. Four provinces have a relative higher percentage of certificate staff: Nampula 63%, Cabo-Delgado 63%, Tete 35% and Niassa 33%.

6.2.4 Elementary extensionists

The number of elementary extensionists declined from 47 in 1999 to 38 in 2004. Most of these were the pioneer staff members employed in public extension and many had worked on state farms during the 1980s. To reduce the number of elementary extensionists, it was necessary to retire or transfer them to other MADER's institutions or activities or to compensate them for retirement. Two provinces have a high percentage of elementary extensionists: Niassa (29%) and Tete (14%). Figure 6.1 summarizes the evolution of human resource in DNER from 1996 to 2004.

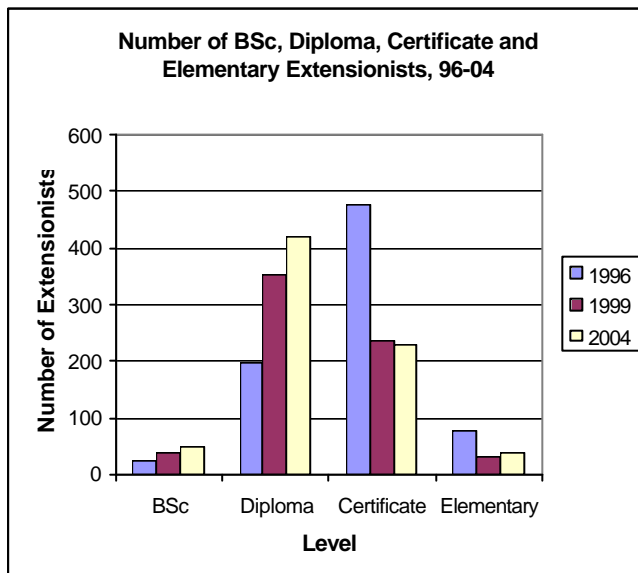


Figure 6.1 Number of BSc, diploma, certificate and elementary extensionists, 1996-2004.

6.3 Non-Formal Staff Training: Findings and Comments

In-service training is a challenging exercise to keep staff informed and updated in relevant subject matter and new knowledge and skills to help DNER carry out its mandate as service provider, extension coordinator and service contractor.

6.3.1 Academic education of the interviewed extension workers and their entrance phase to DNER

The sample reveals that about 35% of the interviewed staff members were graduates of general secondary schools because of the limited availability of agricultural diploma technicians opting to work in rural zones. These new staff members were required to attend “pre-admission” courses and subsequently develop the technical knowledge through in service training. Figure 6.2 shows the educational level of the interviewed extension staff.

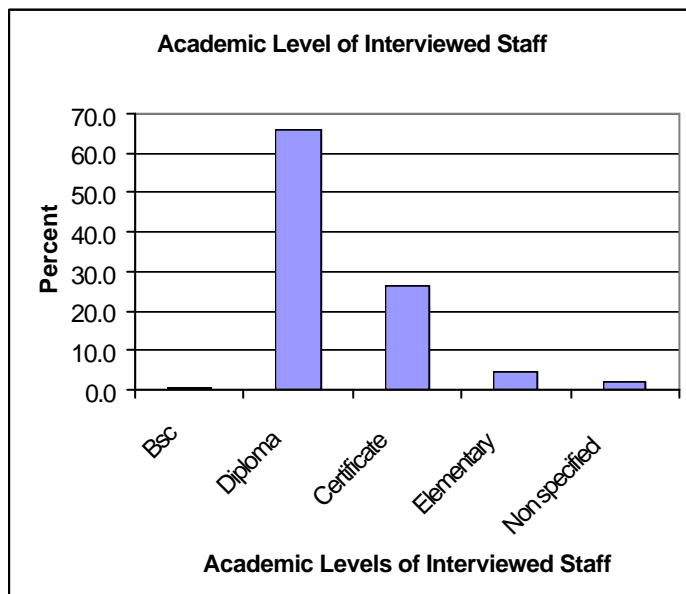


Figure 6.2 Academic level of interviewed staff

The sampled academic level distribution is proportional to the current DNER's staff academic situation which comprises ~7% of elementary extensionists, about 31% certificate, 57% diploma and about 7% of BScs. The number of BScs in the sample is small because they are mostly located at provincial and central offices.

6.3.2 Hierarchy of positions and years of experience in DNER.

The hierarchy of positions comprises field extensionist (FE), team supervisor (TS), network supervisor (NS) and network subject matter specialist (NSMS). The 260 interviewed held the following positions: 205 (78.8%) were FE, 22 (8.5%) TS, 14 (5.4%) NS, 15 (5.8%) NSMS and 4 (1.5%) didn't answer the question. Figure 7.3 shows the hierarchy positions of the interviewed staff.

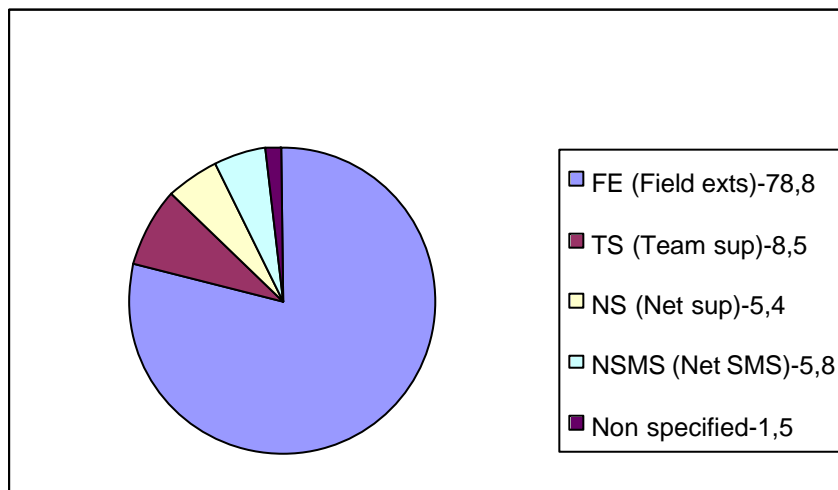


Figure 6.3 Hierarchy of positions of interviewed staff (%)

The median period of *years of work* (in DNER) of the 260 interviewed extensionists was 8.6 years. Since DNER was established and started to contract staff in 1987, this figure is equivalent to roughly to one half of the life of DNER's existence, i. e., there is a considerable turn over. This has been an impressive achievement in terms of the acquisition of new staff and in light of the funding uncertainties under PROAGRI. The second stage (1993-1997) of expansion of extension throughout the country and the third phase (1998-2004) were dedicated to human resource development (including contracting

out) under unified extension. Five provinces had a high average number of *years of work*: Zambezia (10.7), Tete (10), Nampula (9.7), Sofala (9.6) and Cabo-Delgado (9.5). These provinces have maintained a high numbers of certificate (and some elementary) staff working since the beginnings of public extension. Provinces such as Gaza, Inhambane and Maputo had a lower number of years worked because they renewed staff members on contracts over time. About 26 % of sampled staff had previous experience in rural extension working for NGOs, in rural development projects or private enterprises, and in promoting cash crop production.

6.3.3 Pre-admission course (PAC): staff participation and perceived relevance

PAC is the selective course offered by DNER to the candidates who are being considered for employment by public extension. From the sample, 214 of the 260 extensionists (82%) passed the “pre-admission” course. Twelve of the 46 who didn’t take the PAC course were from Tete and 10 were from Sofala. The need to replace extensionists because of death (motorcycle’s accidents, HIV/ AIDS, etc), promotion or abandonment helps explain why some staff didn’t participate in PAC courses.

The perceived relevance of PAC by the extension workers was as follows: 113 (~44%) evaluated the course as relevant and useful from the starting point as professionals and throughout their career, 47 (18.1%) considered the course relevant only at the beginnings of their work in DNER, 58 (22.3%) considered PAC as relevant but some of these participants reported that it should be improved in content and should include a broader array of courses. Only three (1%) extension workers considered PAC as non relevant although it added “some extension knowledge” to the new extension staff. A total of 39 (15%) didn’t answer the question about PAC. Since less than 50% of the staff were satisfied with the course, it follows that PAC should be revised in terms of subjects, content and timing.

6.3.4 Staff access to in-service training

The need for refresher courses for frontline staff has increased since 1998 with the adoption of unified extension: crop production, agro-forestry activities, livestock extension, natural resource management, farmer organizations and community development. Cross cutting issues such as gender and HIV/AIDS have also been included in training modules. Refresher courses last one or two weeks.

Four categories of access were used to define participation in short training courses over the last 3 years: *high participation*, for those who participated in at least five courses per year; *medium participation*, at least three to four per year; *low participation*, at least one to two courses per year; and *no participation*. From the sample, 13 (5%) responded as having *high participation*, 63 (24%) *medium*, 103 (40%) had answered *low participation*, 64 (25%) didn't participate in any course and 17 (7%) didn't answer the question. Figure 6.4 shows the number of extensionists by the four categories of participation.

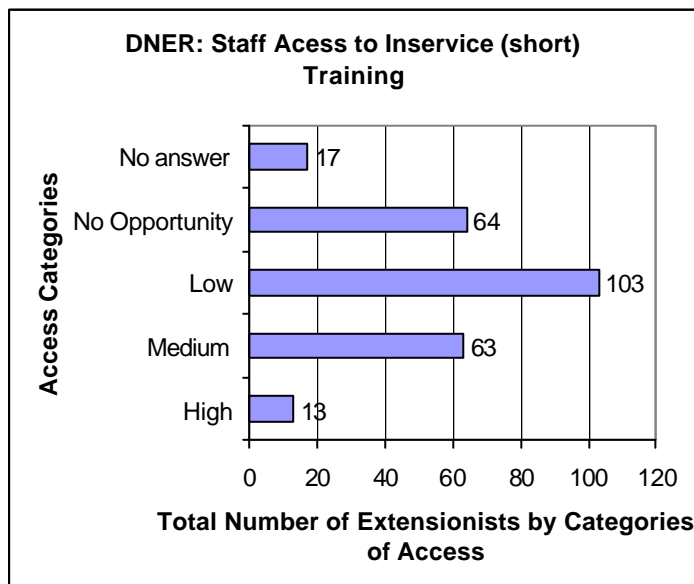


Figure 6.4 Staff access to in-service training

The results indicate that the access to in-service training was low or did not exist for 64% of the interviewed agents. Cabo-Delgado, Sofala and Nampula had the highest percentages of extensionists without an opportunity to participate in training courses: 52%, 38% and 37%, respectively. The provinces of Inhambane (73%), Manica (48%) and Nampula (47%) also had large percentages of *low* access. Niassa, Gaza and Tete provinces had the largest percentages of extension workers with *medium* access: 50%, 42%, 39%, respectively. These results show that the number and frequency of short-training courses at network level is low taking into consideration the PRES's annual training programs of 5 to 12 short planned courses per year over the last three years. Three reasons explain the low level of access for in-service training. First, the annual budget ceilings or delays in the quarterly disbursements of funds in some provincial extension services (SPERs) resulted in annual training programs being only partially accomplished. Second, some of the SPERs offered in-service training at the district level owing to the availability of facilities and communication. Third, provinces with higher numbers of interviewed staff such as Nampula and Cabo-Delgado had performed poorly in implementing in-service training during the period 1999-2004.

The Extension Master Plan emphasized the need for regular and dynamic staff training as of paramount importance for DNER's effectiveness.

6.3.5 Relevance and improvement of In-service training

When asked about the relevance of DNER's in-service training, 70 extension workers (27%) considered it as very relevant, 154 (59%) as relevant but not reaching all staff, 19 (7.3%) as reasonably relevant while 13 (5%) judged it as not relevant. The results reveal that a total of 224 extensionists (86%) recognized the relevance of staff training but 154 criticized its limited training coverage. In order to improve in-service staff training, 93 extensionists (36%) suggested regular training for the SMS and technicians in central DNER and SPER training units. Eleven (4.2%) considered it important to adapt training modules to the local conditions. A total of 61 (24%) made suggestions beyond the scope of training and 90 (35%) didn't mention any measure to improve training relevance.

Therefore, of the 260 extensionists, 151 (59%) were unable to suggest any action to improve DNER in-service staff training.

6.4 Perceptions About DNER's Guiding Principles

The PAC and in-service short courses are intended to update the knowledge of staff throughout their careers. Although there are variations in the environmental (physical, socio-cultural and economic) factors in the 66 districts in which public extension is currently operating, some general extension knowledge and skills are needed by all agents. Based on this assumption, some standard SMS modules are used in short term training, while others are adapted to specific agro-environments in the ten provinces.

6.4.1 Perceived public extension philosophy

The DNER's philosophy could be defined as *helping farmers to help themselves* because of the great emphasis on the educational dimension over time. However, technology transfer (*"helping farmers to develop"*) is also an important part of the mission of public extension. How the extension workers understand and utilize the guiding philosophy of DNER influences their professional attitude with farmers.

A total of 143 of the respondents (56%) reported that the role of extension is "to train and empower smallholders farmers to be able to take better decision on their farms". A total of 107 others (42%) considered their mission was "to train farmers in how to use improved production practices and technology". The others gave different answers such as "to implement extension with, or to farmers". Turning to opinions about DNER's extension philosophy, 159 of the 260 considered it was "to train and empower farmers...." while 54 reported that it was to "train farmers in the use of improved production techniques and technology", while 19 suggested different roles and 22 (8.5%) didn't answer. Therefore, while 56% of sampled staff understands their role as educational, 42% perceive it as to be as technology transfer agents. Asked about the ideal philosophy, the majority of staff (61%) suggested that DNER's philosophy should be the educational

based approach of *helping farmers to help themselves* rather than transfer of technology to farmers.

6.4.2 Farmer participation

The perceptions about farmer participation varied among extension staff: 149 extension workers (57%) viewed it as a tool to pursue agricultural development while 75 (29%) considered it as a tool but also an objective of extension. Only 22 (9%) judged it as an objective of extension and the others didn't respond or gave different answers. There is a wide variation in beliefs on how farmers should participate in extension: 119 extensionists (46%) believed that farmers should be involved in planning, implementation and M&E while 56 (20%) reported that consultation in planning and farmers involvement in implementation were sufficient. A total of 47 (18%) believed that it should be during implementation and evaluation phases and only 28 (11 %) identified farmer's participation in implementation as enough. Thus, less than one half of sampled staff judged farmer participation as necessary in planning, implementation and M&E of extension activities.

6.4.3 Problem identification and prioritization

In practice, there are different procedures for problem identification and prioritization. From the sample, 109 of the 260 extensionists (42%) responded that they and the farmers jointly identify problems and set priorities in their rural zones while 44% excluded the involvement of farmers in problem identification and prioritization. Only 8% and 7%, respectively mentioned PSRE and the DNER central level as being involved in problem identification and prioritization. The infrequent mention of DNER's role in setting priorities reveals the ongoing role of decentralization of extension management to the provincial and district levels. The role of central DNER and PRES's is to encourage extension networks to include some national initiatives in their annual plans such as soil and water conservation, reduction of post-harvest losses, control of animal domestic

diseases, improvement in animal nutrition, etc. Less than one half of the sampled staff involved farmers in problem identification and prioritization.

6.4.4 Planning

Turning to how the extensionists plan their activities, the survey revealed that 83 (32%) plans with their supervisors followed by a discussion with farmers, 57 (22%) plan with their community leaders and 19 (7%) consult community leaders. However, 78 (31%) plan their activities without farmer's participation and involve their team or network supervisors. Eighteen (7%) gave different answers and six staff members (2%) didn't answer the question. Asked about the ideal planning for them, 63 (24%) preferred to plan with community leaders while 40 (15%) wanted to involve both community leaders and extension supervisors. Therefore, a total of 103 (39%) preferred to have farmers play an active role in planning while 85 (33%) suggested that they (extensionists and supervisors) should be responsible for planning. A total of 20 (7%) staff members thought that planning should depend on specific cases while 42 (16%) didn't respond.

6.4.5 Monitoring and evaluation (M&E)

Turning to M&E, 161 (61%) agents reported it was done by the team supervisors, 54 (21%) by the network supervisors, 19 (7%) by the district directors of agriculture (DDA's), 18 (7%) by PSRE's and only four staff members (2%) mentioned DNER's central staff. In fact, team and network supervisors devote most of their time (60-70%) on field M&E and the rest of time on activities such as monthly staff training, reporting and logistical issues. The PSRE's also have responsibility for M&E but with less frequency, depending on available funds and on the distance between the extension networks in each province. DNER's central level M&E is done on a quarterly or on a semi-annual basis for selected provinces.

The sampled extension workers have different opinions about how M&E should be done: only one (0.4%) supported the continuation of team supervisors (one team supervisor

works with 8 extensionists) while the role of network supervisors is reinforced by 68 (26%) staff. A total of 54 (21%) suggested that the role of DDA should be increased while 43 (17%) suggested the same for the PSRE's. Only five (2%) agents mentioned the DNER's M&E role while a total of 84 (32%) didn't express an opinion on how to improve M&E. Figure 6.5 illustrates the current and suggested scenarios for M&E.

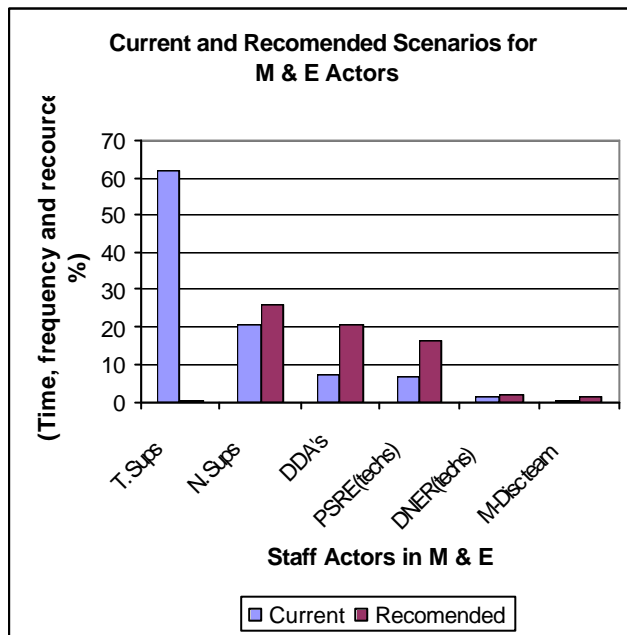


Figure 6.5 Current and suggested scenarios for M&E.

The results gave less importance to M&E by team supervisors because of poor professional performance of some team supervisors and their close working relationship with staff. The team supervisors live in villages and oversee the work of eight extension workers over a space of ten days while network supervisors make one round of personal visits to extensionists every 20 to 32 days – depending on the size of network (8 to 24 extension workers). Also, most network supervisors, DDAs and M&E technicians from PSREs and DNER's central level, are better prepared professionally. For frontline extension staff, it is useful to receive feedback from those with more competence than from "colleagues" working together in the same villages.

6.4.6 Adopted extension models

The T&V extension model was adopted at the beginning of DNDR and modified in 1992-1993. The Farmer Field School (FFS) model was introduced in public extension from 2001 through the FAO food security special programs in Manica, Sofala, Maputo and Zambezia provinces. Due to the enthusiasm for the model in PDARDs, the FFS model is being included in in-service staff training programs throughout the country.

A good understanding of the weaknesses and strengths of T&V and FFS is essential for staff to avoid the use of useless practices. Asked about three weaknesses of the T&V model in their localities, only 38 (15%) gave three answers, 35 (14%) mentioned two and 45 (17%) only one weakness. A total of 122 (47%) didn't point out any problem with T&V. The staff was also asked to describe two weaknesses of the FFS model. Only 9 (4%) identified two weaknesses, 36 (15%) gave one response, 18 (8%) answered wrongly and 180 (74%) didn't answer. Although FFS is relatively new in Mozambique, staff members should have known more about it. The PAC course is the principal one on which frontline extensionists are exposed to extension knowledge. When a new extension model is introduced in public extension a theoretical practical course is given to the extensionists. However, the lack of manuals and publications related to a theoretical discussion of extension models contribute to the lack of extension knowledge. In addition, the regular quarterly training sessions of the frontline extensionists have been more focused on technical issues rather than methodological issues.

6.5 Staff Member's Technical knowledge

As agricultural technicians working with farmers, the extensionists should be technically confident on the basic subject matter of knowledge in their zones of work. DNER's refresher courses aimed to create a sound basis of "critical knowledge" among staff members throughout the country.

6.5.1 Identified main crops (cereals, pulses, roots and tubers)

Cereals, pulses and roots were identified as principal crops by the interviewed extensionists in their zones of work: A total of 152 (59%) identified maize (*Zea mays L.*) as the most important, 54 (21%) cassava (*Manihot esculenta*), 22 (9%) rice (*Oryza sativa*), and 6 (2%) sorghum (*Sorghum bicolor*). The following crops were mentioned to a lesser degree: pearl millet (*Pennisetum typhoides*), groundnut (*Arachis hypogea*), cowpea (*Vigna unguiculata*), sweet potato (*Ipomea batatas*), onion (*Allium cepa*) and tomato (*Helicuperium esculenta*). Figure 6.6 shows the principal crops identified by the extension workers in the sampled 33 districts.

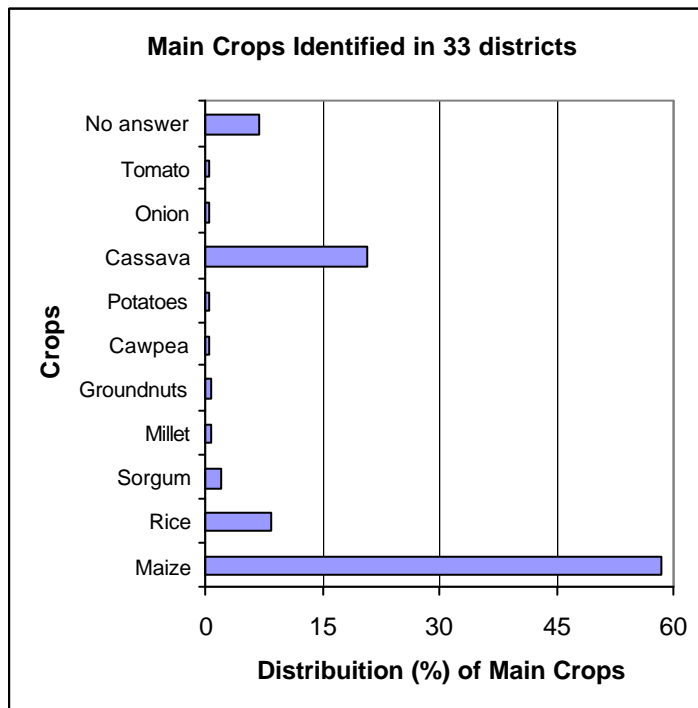


Figure 6.6 Identified main crops by interviewed staff in 33 districts

6.5.2 Land preparation, soil erosion and fertilizer

Traditional (conventional) land preparation is practiced by most farmers and it is well known among technicians. Since 1997, DNER introduced “zero till” and “minimum till”

technologies throughout the country. Since then, the focus has been given on staff training and establishment of thousands of DEMO's plots over time. Asked about the types of land preparation, 100 extensionists (39%) mentioned "zero till", only five (2%) "minimum till" while 242 (93%) extensionists identified conventional land preparation. A total of 107 (41%) extension workers considered "zero till" as more beneficial for the soils over time (structure, organic material %, soil humidity) while 70 (27%) mentioned the conventional land preparation as better. Although a substantial number of staff knew about "zero till", this practice is still new in DNER's knowledge system and it should be subjected to economic analysis by the MADER's agricultural economics research. A total of 61 (24%) reported that soil erosion was not a problem in their zones of work, 99 (38%) classified it as reasonably serious, 47 (18%) evaluated it as serious and 53 (20%) reported that it was a very serious problem. This means that 39% considered soil erosion as a serious problem in their localities. Currently, it is estimated that about 40% of agricultural land in Mozambique is under erosion or seriously exposed to it (INIA, 2004). Since 1995-1996, some technologies and practices to address soil erosion have been disseminated by DNER, especially in the affected zones. A total of 98 (38%) of the extension workers mentioned "vetiver" grass as a promising technology and 63 (24%) nominated contour lines for soil preparation. The results show that improved practices and technologies to combat erosion are not well known by extension workers. There is a lack of SMS in soil fertility and conservation in Public extension at the central and the provincial levels. The first SMS holding BSc degree in agronomy and working in soil conservation at the DNER central level was contracted in 2002. There is a need to improve technical backstopping of the frontline extensionists and to expand their knowledge on this topic.

Most of the extensionists were able to differentiate fertilizer according to its composition. A total of 160 (62%) mentioned organic and 163 (63%) inorganic. The rest referred to different types of inorganic fertilizer (for example, NPK, DAP, etc) instead of including it in the two general categories. In their zones of work, 173 (67%) identified basal dressing and 182 (70%) the top dressing as common fertilizer applications. The rest didn't answer

or gave wrong responses. A substantial percentage of technicians (about 30%) failed or were uncertain about the basic agricultural issue of fertilizer.

6.5.3 Some agronomic practices

Intercropping is the dominant planting practice among smallholders throughout the country. Crop rotation is another common practice. Over time DNER's extension workers have tried to promote the adoption of best practices (selected crops, time of planting, spacing) in intercropping and rotation by farmers. A total of 27 respondents (10%) recommended cereal intercropping for farmers, 62 (24%) advised farmers to plant cereals and roots and tubers and 154 (59%) encouraged smallholders to plant cereals and pulses. Only three (1%) recommended roots and pulses while 14 (5%) others didn't answer. Because of the potential nitrogen fixation by pulses, cereals/ pulses intercropping is recommended, and almost 60% of staff concurred it.

Turning to the importance of crop rotation, extension workers delivered different messages to farmers: 214 (82%) considered crop rotation as important to reduce the incidence of pests and diseases, 129 (45%) mentioned it as contributing to rebuilding soil fertility when appropriate successive crops are used and only 10 (4%) mentioned crop rotation as contributing to a reduction of soil erosion.

Weed infestation and the lack of family labor to overcome the problem are two of the problems affecting smallholder agriculture. During one national diagnostic survey in 1999 in extension zones, about 40% of the farms visited had severe weed infestation (Gemo (ed), 2001). DNER advises farmers to maintain the farms free of weeds during the critical stages of crops. A total of 164 (63%) extension workers reported that it was crucial to maintain fields free of weeds at least until the crop flowering stage while 37% gave wrong answers.

Irrigation is needed, particularly in Mozambique's south and center regions. However, there are only a few DNER's initiatives for irrigation by smallholders. About 1000

treadle pumps with capacity of 0.5 ha were introduced from 2001 to 2003 throughout the country. Also three small irrigation schemes (8–10 ha) were set-up in Sofala, Inhambane and Maputo provinces in 2002. In some of the 66 districts in which DNER is operating, public extension is also involved in drainage (or irrigation) in low wetlands on rice (cultivated in about 200.000 ha) and horticulture production. Although these initiatives are limited, there is a large potential to expand small to medium irrigation schemes using surface water. Basic information is needed by extension staff in order to advice farmers on the technical and economic issues surrounding irrigation. The results of the interview revealed that only 85 (32%) knew about the importance of knowing the type of soil (sandy, clay, clay-loam soils, for example), 183 (70%) temperature data, 60 (23%) rainfall data and only 7 (3%) indicated that crop evapo-transpiration was also important. These results reveal that extensionists need more knowledge about irrigation.

6.5.4 Crop pests and diseases

Turning to the cereal diseases, 159 (61%) extensionists identified the most common diseases in their zones of operation, 23 (9%) answered wrongly and 78 (30%) didn't answer. Apparently the non-respondents were the agents who had considered cassava as more important in their zones of operation. Downy mildew (*Peronosclerospora sorghi*) and bacterial blight (*Dreschlera turcica*) were the two diseases identified by 57 and 58 extension workers, respectively. A total of 147 (57%) mentioned the most common pests, 35 (14%) gave wrong responses and 78 (30%) didn't answer. Stem borer (*Busseola fusca* and *Maliarpha separatella*), *Quelea* birds in rice and elegant grasshopper (*Zonocerus elegance*) were the most frequently identified pests.

Asked about pulses, only two mentioned legume streak virus diseases and pests such as *Agrotis sp.* and leaf, stem and grain hoppers (*Spodoptera sp.*). One extensionist gave a wrong answer and the remaining 257 (99%) didn't answer. These results were a surprise because pulses are important food (and cash) crops. Pulses are commonly cultivated by thousands of smallholders in intercropping regimes during the main season and as a pure culture in the dry season.

Cassava was identified as an important crop by 54 extension workers (21%). A total of 45 (17%) mentioned *cassava brown streak virus* and brown spot (*Cercosporidium henningsii*) while 10 (4%) answered out of context and 205 (79%) didn't answer. A total of 47 extensionists identified mealy bug (*Phenacoccus manihot*), termites (*Isoptera sp*), rats (*Praomys natalensis*) and elegant grass hopper (*Zonocerus elegance*) as the most common pests while eight extensionists responded wrongly and 205 didn't respond.

The results show that there is insufficient knowledge about pests and diseases. The agronomic training modules have been focused on cereals. More attention should be given to pulses, roots and tubers.

6.5.5 Post harvest: grain and roots conservation and small-scale processing

In Mozambique, post-harvest (grain and root) losses are estimated to be around 30% (Siteo, 2000). Several interventions have been made by extensionists since 1998, namely introduction and dissemination of improved granaries, improved small-scale processing machines for cassava and sweet potatoes and manually operated oil presses for sesame and sunflower. A total of 184 (71%) considered grain drying as crucial to reducing pests and disease incidence during conservation, 38 (15%) mentioned avoiding early grain deterioration, 27 (10%) gave wrong answers and 11 (4%) didn't respond. Once again, about 15% of the staff ignored the need to dry grain. For improved storages: 217 extension workers (84%) mentioned an adequate height of granaries, 75 (29%) protection against rats, 42 (16%) appropriate construction material (to reduce granaries humidity), and 247 (95%) indicated that the correct location of granaries is important. The results reveal that more knowledge about improved granaries is needed among extension staff.

Extension workers stressed the growing importance of small-scale processing (rice cleaning machines, grain mills, manually oil pressers and cassava and sweet potatoes machines) in their zones of work. A total of 185 (71%) reported that these machines

should be given high priority on the extension agenda, 36 (14%) medium priority, 18 (7%) low priority while 21 others (8%) didn't express an opinion.

6.5.6 Livestock diseases

Extensive smallholder poultry production in rural zones was defined as an important DNER's priority since the beginning of unified extension in 1998. Poultry production is viewed as an important rural poverty fighter, particularly in rural zones. Newcastle disease is one of the main constraints on poultry production. With an annual Mozambican production of 23 million chickens (TIA, 2003), Newcastle is responsible for 50 to 80% of annual poultry losses (Mavale, 1995). Extension workers are involved in the dissemination of knowledge about the symptoms as well as vaccination. Regarding common symptoms of Newcastle: 74 (29%) extension workers mentioned chicken's fever and sickly look, 103 (40%) identified diarrhea and only 9 (4%) referred to self isolation. Taking in account the high incidence of the disease, especially in rural zones, extension workers need better knowledge about poultry production.

Goats are important rural assets. An estimated 5 million goats are in the country. As the most common diseases in their zones of work: 115 (44%) extensionists reported Ricketsiose (*Cowdria ruminantum*), 37 (14%) Mangué, eleven others mentioned different other diseases while 97 extension workers (37%) reported that the question was not applicable because goats were not common in their zones. Therefore, 63 % of the agents are aware of the goat's common diseases in their zones and this represents a satisfactory knowledge.

Currently there are about one million cows in the country (TIA, 2003). Smallholders own about 94% of cattle, particularly in south and center regions. Most of the cattle are concentrated in Tete, Manica, Inhambane, Sofala and Gaza provinces (TIA, 2003). Since the cattle are raised in an extensive manner, the health issues have received most extension efforts. Extension workers have carried out some training sessions about the common pests and diseases as well as their symptoms. A total of 54 (21%) extensionists

mentioned cow diseases such as Rickettsiose (*cowdria ruminantum*), Anaplasmosis, foot and mouth disease, tuberculosis, babesia and intestinal parasitosis. Mozambique has a growing cattle population. Since most cattle are in the hands of small-scale farmers, current extension activities and related knowledge should be improved.

6.5.7 Agro-forestry extension

The integration of agro-forestry activities into the extension agenda is still below expectations. The results from the interviews confirm this reality at the field level because only 15 (6%) referred to their involvement in the campaigns against bush fires and 11 (4%) were engaged in reforestation. The others 234 (90%) didn't answer or gave wrong answers. In fact, provinces such as Niassa, Manica and Tete have been involved in tree planting and beekeeping programs (including Matutuine network in Maputo province) with smallholders.

6.6 Unified Extension System (UES): Perceived Performance, Constraints and Needed Improvement

UES was adopted in 1998 under the PROAGRI I and IFAD provided initial financial support to four pilot provinces: Manica, Tete, Nampula and Cabo-Delgado. As a result of the pooling of donor support into PROAGRI in early 2001 UES was implemented in all provinces under this new funding mechanism. The results of the interviews reveal that 35 extension workers (14%) considered UES as well implemented, 63 (24%) as satisfactory, 109 (42%) as reasonable, 30 (11%) viewed it as poor and 23 (9%) didn't answer the question. Overall 54% viewed UES as reasonably to poorly implemented while 38% of the agents classified it as good to satisfactory.

Different reasons for the unsatisfactory performance were pointed out by the staff members: 24 mentioned weak coordination between involved services (DNER, livestock, forests and irrigation national directorates), 16 reported a lack of knowledge about the

functioning of UES among the extension staff, and eleven referred to the low commitment of the managers to achieve the desired cohesion of UES. However, 72 extension workers pointed to factors such as: poor staff incentives, lack of integration of staff on contracts and lack of satisfactory career paths for the whole extension system. The other 137 (51%) didn't mention any reason. Staff did not seem to know UES that well.

To improve UES performance, 52 (20%) of those interviewed considered it important to continue in-service short training in the relevant subject matter and 26 (10%) recommended better coordination among the involved national directorates. A total of 100 (39%) gave several wrong opinions and 82 (31%) didn't answer.

These overall results reinforce the view that there is a poor understanding of the philosophy, rationale and functioning of UES. That is, the extensionists are aware about the need for dealing with farming systems in their zones and they can evaluate to what extent UES is effective. However, at the same time, the majority was unable to suggest *measures* for improving UES.

CHAPTER VII

SUMMARY AND RECOMMENDATIONS

Mozambique's public agricultural extension (DNER) is a relatively new institution compared with other services in Southern Africa. Since its establishment in 1987, human resource development has been a priority item on its agenda. Two approaches were adopted by DNER to improve human resource development of its staff over time. The first focused on in-service training (non-formal and formal); and the second was to hire extension workers with diplomas on contract to replace certificate and elementary level staff.

Public extension service has moved through three evolutionary periods: the establishment phase (1987-1992), the expansion phase (1993-1997) and the unified extension and PROAGRI (National Agricultural Development Program) stage (1998-2004). Each of the three phases has addressed DNER's human resource challenges. During the last phase (1998-2003), challenging goals were set for human resource improvement. After 17 years of public's extension programs to improve its staff over time, it is of paramount importance to evaluate the current status of DNER's human resources.

This study was carried out during the unified extension and PROAGRI period from 1999-2004. The results show some impressive achievements in adding new diploma, BSc and MSc staff members to the system as well as improvements in short in-service training. However, substantial improvements still need to be made to develop and strengthen the technical knowledge and competence of DNER's staff members.

One of the implications should be to integrate the DNERs human development and training program as part of the M&E regular system. This will allow periodic monitoring of the performance and constraints of in-service training. The subject matter specialists (SMS) are very important in assessing this process and in giving support in their areas of specialization within the entire extension system. Collaboration with agricultural educational institutions (formal and non-formal) in obtaining expertise is also to be

considered, particularly for teaching complex or new technical and managerial topics to be introduced in public extension.

Reinforcing training units at central and provincial levels with an eye towards the co-identification of knowledge needs in collaboration with SMSs, programming, funds mobilization and implementation (directly or through outsourcing) of in-service training programs is also a priority. The criteria for extension staff access to in-service training should be revised to ensure equity throughout the country and over time according to the identified knowledge needs.

The academic qualifications of all public extension human resources require improvement. Formal training and recruitment of new qualified staff still ongoing condition to the success of public extension. Institutional commitment in encouraging these approaches, in mobilizing financial resources, and facilitating access to scholarships for the extensionists and management staff are of paramount importance.

7.1 Summary

7.1.1 Formal training

The planned upgrading of public extension staff from 1999 to 2004 was partially accomplished. However, the target for certificate upgrading to diploma was not achieved because only 13 were trained instead of 138; diploma upgrading to BSc level exceeded the target from the 13 planned to 27; and BSc upgrading to MSc level was also not achieved by upgrading only 5 out of 9 planned. The goal of having only diploma frontline extension workers by 2004 was not reached. DNER's staffing in late 2004 includes 422 (61%) diploma staff, 227 (33%) certificate extensionists and 38 (6%) elementary agents.

7.1.2 Contracting out Diploma staff

Improvement in human resources was more rapid between 1996-1999 than 1999-2004. In 1996 the status was: 199 (26 %) of diploma staff; 477 (62 %) of certificate; and 89 (11 %) elementary agents. It was a period of geographic expansion and new diploma staff were hired using direct World Bank co-funding to the public extension service.

7.1.3 Informal Training

The academic level of the interviewed extensionists (n=260) was proportional to DNER's human resource scenario in 2004 and was representative in terms of the academic training of its current staff of 735. There are a significant number of extensionists with a secondary school background (about 35% of the sample), which suggests that DNER needs to improve the agricultural knowledge base for these technicians.

a) Extension Knowledge

7.1.3.1 PAC, access to in-service training, DNER's philosophy and farmer participation

Eighty two percent of the interviewed staff attended PAC courses. A total of 44 % of those who participated described PAC as relevant to the extensionist's career and 18% as partially relevant. This indicates that PAC was useful in providing basic extension knowledge and technical subject matter at the beginning of an extensionist's career. Staff member's access to in-service training was low: about 64% of staff had low or no access to in-service training. The study revealed that 86% of extensionists with access considered DNER's in-service training as relevant.

DNER's extension philosophy and the need for farmer's participation were studied and 56% of the interviewed staff assumed that DNER's goal was to increase farmer's empowerment based on the adult educational training while 41% considered technology

transfer to farmers be the most important goal. Forty six percent referred to farmer participation as needed in both planning, implementation and evaluation of extension activities while the others gave several answers (involving farmers during the implementation, or at evaluation stage, etc.)

7.1.3.2 Problem identification, prioritization, planning and M&E and extension models

Extension staff members play a substantial role in problem identification, planning and M&E. About 45% of staff interviewed considered problem prioritization in the hands of both farmers and extensionists while 30% identified it as a role played by both extension workers and supervisors. DNER's central office involvement was mentioned by only 7% of the interviewed technicians, which is a reflection of ongoing decentralization. A total of 61% of the sampled staff pointed out that planning was done by the extensionists and supervisors and 29% reported that it was done by both extension workers and farmers. The results indicate that farmer's involvement in planning is still a goal to be achieved.

M&E is mainly (and correctly) under the responsibility of the district level (89%), involving team and network supervisors and the district directors of agriculture (DDAs). Once again, PSREs and DNER central level were mentioned by only 7% of staff.

There is a lack of knowledge about DNER's extension models: only 46% of extension agents identified one to three weaknesses of the T&V system. For Farmer Field School (FFS) only 19 % mentioned one to two weaknesses. Extension staff should be more aware about the theory of different models as a basis for developing critical thinking and interacting with farmers.

b) Extensionist's Technical Knowledge

7.1.3.3 Land preparation, soil erosion and fertilizer

Traditional land preparation is well known by the extensionists (93%) while “zero till” and “minimum till” are known by 39% and 2 %, respectively. Because these practices have been disseminated since 1998, they should be well known by staff. A total of 78 % of sampled staff reported soil erosion as a problem (from reasonable to very serious) in their zones of work. However, only a maximum of 38% identified one of the physical measures disseminated by DNER in the affected zones. About 62% to 67% respectively mentioned two categories of fertilizers (organic and inorganic) and about 70% referred to basal and top dressing as the two main fertilizers applications in their zones of work. It is clear that DNER staff need more help on technical matters related to soil management.

7.1.3.4 Intercropping, rotation, weed infestation and irrigation

Since intercropping dominates smallholder agriculture, knowledge about best practices is important: about 60% pointed out a mixture of cereals (particularly maize) crops and pulses (groundnut and cowpea or beans) as optimal intercropping but 30 % mentioned questionable recommendations. From 10% to 82% of staff identified different valid reasons for the need for crop rotation. On weed control, 63% mentioned that farmers are encouraged to keep their fields free of weeds until crop flowering but 37% gave wrong answers. Basic knowledge is needed on good irrigation advice to farmers: 60% and 70% mentioned the need for rainfall and temperature data, only 32 % about type of soils and only 3% referred to crop evapo-transpiration. Extension workers in general need more information about basic technical and economic guidelines on irrigation.

7.1.3.5 Crop pests and diseases

The results show that there is an unsatisfactory knowledge of pests and diseases. On average, 30% of the staff didn't answer the question about the most common pests for cereals even though maize or rice or sorghum are cultivated in almost all extension zones. Likewise, 99% did not understand the common pests and diseases in pulses and 83% didn't have the basic information of cassava pests. Over time DNER has increased its attention to cereals in in-service training but very little attention has been given to pulses, roots and tubers. Since the country's potential for pulses and cassava production is high, this lack of knowledge needs to be addressed.

7.1.3.6 Post harvest: grain and roots conservation and small-scale processing

The results reveal a satisfactory understanding of some post harvest issues. For example, 85% of the interviewed staff knew about reasons to dry grain and roots, a minimum of 16% and a maximum of 95% of staff gave different characteristics related to improved family granaries, and about 71% pointed out that small-scale processing is of high priority in their zones of work.

7.1.3.7 Livestock diseases

About 40% of the extension agents interviewed pointed out some of the symptoms of Newcastle disease. Since poultry represent one of the main livestock targets, this level of knowledge is insufficient. A total of 62% of staff mentioned various goat diseases. This is an acceptable number since some extension zones do not have a tradition (or potential) in goat production. Although about 89% of cattle are in the hands of smallholders, only 21% were able to identify different cow diseases. Presently, livestock technicians are more involved in cattle health and in several extension zones "tse-tse" hampers cattle

production. However, the current level of staff knowledge about cattle diseases should be increased.

7.1.4 Unified extension system (UES)

About 38% of the sampled staff considered UES as satisfactory to good while 53% classified it as reasonably to poorly implemented and 9 % didn't respond. The majority of staff was not satisfied with the performance of UES although only 20% of them were able to point out reasons behind the unsatisfactory performance of UES. Many extensionists have a weak understanding of UES.

7.2 Recommendations

7.2.1 Formal training

Formal career training is of paramount importance for a relatively young extension organization such as DNER. Currently DNER has a substantial share of staff with poor qualifications. A well designed career training program is needed to develop a critical scientific foundation for DNER staff, especially for subject matter specialists. Since the upgrading of staff is essential, DNER should continue providing and facilitating career training opportunities to staff based on career needs, age and the need for DNER to address new issues such as smallholder irrigation and agro-business.

DNER is a young institution engaged in developing Mozambican models of extension. Therefore, DNER should draw on useful experiences in other countries. Also it should encourage promising staff members to pursue BSc and MScs training out of the country, particularly in developing countries with successful smallholder agricultural experiences. But general problems, such as low salaries and lack of extension career and incentives are hampering human resource development. These issues should be on Ministry of Agriculture agenda because they are the key to build a stronger extension and research.

7.2.2 Non-formal training

Pre-admission courses (PAC) have played an important role for induction and foundation training. However, the survey revealed the need to review the content, material and timing of the PAC courses. DNER should address this issue because it plans to hire new staff and open up new extension networks as well as hiring diploma staff to replace the extensionists with certificates. Staff access to in-service training is unacceptably low for many extensionists. In-service training programs should be better planned and financed.

Critical (analytical) thinking is lacking in about 40% of the staff. Staff training should devote more attention to DNER's philosophy, problem identification and more attention to extension models and methods.

One of the major and unexpected findings of the survey of (n=260) extension workers in 33 districts of 128 in all ten provinces was the lack of technical knowledge about smallholder agriculture. For example, a significant share of staff ignored or omitted answering various technical questions about basic agronomic (30-40%) and livestock (30-60%) issues. Refresher courses should be carefully designed and offered to staff, particularly in the relatively recent areas of required knowledge on livestock and agro-forestry. Finally, since about 35% of the interviewed technicians have general secondary background, new staff should be recruited from agricultural schools. DNER's institutional agreements or cooperation with agricultural schools can facilitate hiring recent diploma graduates on contracts.

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APENDIX 1 QUESTIONNAIRE

TRAINING ASSESSMENT: PUBLIC AGRICULTURAL EXTENSION SERVICES

NOTE: THE LAST COLUMN IS FOR OFFICE USE ONLY.

A. GENERAL SURVEY IDENTIFICATION		POST-CODING
A01	Province (encircle response)	1 Niassa 2 Cabo Delgado 3 Nampula 4 Zambézia 5 Tete 6 Manica 7 Sofala 8 Inhambane 9 Gaza 10 Maputo _____
A02	District(s) _____
A03	Extension Network _____
A04	Year of Establishment of the Extension Network	____
B. PERSONAL DETAILS		
B01	Name	
B02	Sex	1 M 2 F _____
B03	Place of Birth (Province) _____
B04	Highest educational attainment (encircle)	Primeira clas 1 1 st Grade 2. 2 nd Grade 3. 3 rd Grade 4. 4 th Grade 5. 5 th Grade 6. 6 th Grade 7 7 th Grade 8 8 th Grade 9 9 th Grade 10 10 th Grade 11 11 th Grade 12 12 th Grade 13 Diploma 14 University degree 15 Post-graduate degree 16 Other non-university, specify: _____

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B05	IF UNIVERSITY OR HIGHER: Degree / Specialization	1 Agronomy 2 Biology 3 Economics 4 Sociology 5 Other, specify	_____
B06	Year of conclusion of studies		_____ _____

C. IN-SERVICE INFORMATION			
C01	Present position (encircle response)	1 Extensionist 2 Team Supervisor 3 Network Supervisor 4 Network subject matter specialist 5. Provincial subject matter specialist 6. Provincial technology officer 7. provincial communication technician 8. Provincial training technician 9. Provincial farmer organization technician 10. Provincial planning, monitoring and evaluation technician 11. Provincial head of extension	_____
C02	Number of years in current position		__ __
C03	Previous positions held within the Public Agricultural Extension Services, STARTING WITH THE MOST RECENT.	(Use position codes above – 1 to 11) a. Most recent: b. Second most recent: c. Third..... d. Fourth..... e. Fifth.....	_____ _____ _____
C04	Where did you first worked in extension? (encircle response)	1. Extension network level 2. Provincial extension service level/provincial office of agriculture 3. Head office (DNER)	_____
C05	No of years in public extension?		__ __
C06	Did you have work before you join extension? (encircle response).	1 Yes 2 No	_____
D. TECHNICAL – PROFESSIONAL QUESTIONS			
Organizational and Functional Aspects of DNER (Philosophy, structure, principles, concepts, models and methods)			
D01	<p style="text-align: center;"><u>General Philosophy of Rural Extension</u></p> What is DNER’s general philosophy of rural extension in relation to the farmer? (Choose the most appropriate answer) Encircle the appropriate answer <ol style="list-style-type: none"> 1. Teach farmers how to use new production techniques and technologies so as to improve their agriculture 2. Train and equip farmers to make better agricultural decisions thereby helping them to help themselves 3. Implement extension for farmers 4. Implement extension with farmers 5. Other, specify :		_____

<u>Structure of Extension Services</u>		
D02	<p>Wwhat is the structure of DNER? (Describe its COMPOSITON at each level).</p> <p>Community / Village</p> <p>.....</p> <p>District</p> <p>.....</p> <p>Province</p> <p>.....</p> <p>Central</p> <p>.....</p>	
D03	<p>What are the main characteristics of the models (INTERACTION between extensionists and farmers and between team supervisors and extension network or with subject matter specialists)?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	
D04	<p>What do you consider to be the principal WEAKNESSES (indicate 2 to 3 weaknesses) if any, of the following models used by DNER</p> <p>Model 1</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Model 2</p> <p>.....</p> <p>.....</p> <p>.....</p>	

D05	<p>What are the principal STRENGTHS (or string points) (indicate 2 to 3 strengths) ,if there are any, of the models used by DNER?</p> <p>Model 1</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Model 2</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	
D06	<p>What other extension models do you know of? (BRIEFLY DESCRIBE)?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	
D07	<p>Prioritizing of identified problems/needs</p> <p>The prioritization of problems/needs and objectives is always necessary. Who is responsible for this exercise? (encircle the answer)</p> <p>1 - DNER at national level</p> <p>2 - SPER at provincial level</p> <p>3 - The extension network as a team</p> <p>4 - The team or network supervisor</p> <p>5 - The extensionists and respective team or network supervisors</p> <p>6 - The extensionists and farmers</p> <p>7 - Other, specify</p> <p>.....</p>	
D08	<p>Describe the importance of planning of extension activities in your work</p> <p>.....</p> <p>.....</p>	

D09	<p>Which best describes the planning of the activities that you undertake?</p> <p>1 My supervisor always plans my activities and I execute 2 My supervisor and I plan my activities together 3 I plan independently and submit them to my supervisor for approval 4. I plan my activities independently 5 Other, specify</p> <p>.....</p>	<p>_____</p>
D10	<p>Describe the importance of monitoring and evaluation in your work</p> <p>.....</p> <p>.....</p> <p>.....</p>	
D11	<p><u>Farmer Participation in Extension</u></p> <p>Farmer PARTICIPATION in extension is often talked about. What do you understand by the term PARTICIPATION?</p> <p>.....</p> <p>.....</p> <p>.....</p>	
D12	<p>How do you perceive participation of farmers in extension</p> <p>1. As an objective in itself that extension should try to achieve 2. As a means to more effectively undertake agricultural development 3. As a means and as an objective to promote farmer's ownership of extension 4. Other, specify</p> <p>.....</p>	<p>_____</p>
E. TECHNICAL SECTION		
E01	<p style="text-align: center;"><u>Agricultural Production</u></p> <p>List the types of soil preparation that you know of.</p> <p>a.</p> <p>b.</p> <p>c.</p> <p>d.</p>	

E02	<p>What type of soil preparation do you consider to be most beneficial for soils and crops (Mention 2 and start with, STARTING WITH THE MOST BENEFICIAL)</p> <p>Preparation Type 1</p> <p>Preparation Type 2</p> <p>Preparation Type 3.....</p> <p>Preparation Type 4.....</p>	<p>_____</p>
E03	<p>Why do you consider these types of soil preparation to be the most beneficial.</p> <p>Preparation Type 1</p> <p>.....</p> <p>Preparation Type 2</p> <p>.....</p> <p>Preparation Type 1</p> <p>.....</p> <p>Preparation Type 2</p> <p>.....</p>	
E04	<p>How serious is soil erosion in the area where you work (encircle response) ?</p>	<p>1. Yes 2. No</p> <p>_____</p>
E05	<p>If yes, what physical measures have been implemented to counter erosion?</p> <p>a.....</p> <p>.....</p> <p>b.....</p> <p>.....</p> <p>c.....</p> <p>.....</p> <p>d.....</p> <p>.....</p>	
E06	<p>In terms of the nature of fertilizers, it is common to talk about different types of fertilizers. What types of fertilizers do you know?</p> <p>.....</p> <p>.....</p> <p>.....</p>	
E07	<p>During the vegetative cycle of a crop it is possible to apply different types of fertilization. What are they?</p> <p>a.....</p> <p>b.....</p> <p>c.....</p> <p>d.....</p>	

E08	What is the most important food crop in the area where you work?	_____
E09	What are the pests or diseases that affect this crop?	_____ _____ _____ _____
E10	What is the second most important food crop in the area where you work?	_____
E11	What are the pests or diseases that affect this crop?	_____ _____ _____ _____
E12	Intercropping is a common practice in the Family Sector. What types of intercropping have you recommended in your zone of work? (encircle all that apply) 1. Intercropping with only different types of cereals 2- Intercropping with cereals and root crops (cassava) 3- Intercropping between cereals and legumes 4- Other, specify:	_____
E13	Why are crop rotations generally important under family sector farming conditions?	
E14	Labour has been a large limiting factor in the family sector, which is reflected in activities such as late weeding. At what stage of the crop vegetative cycle do you recommend or insist that farmers maintain their fields free of weeds?	

E15	<p>Irrigation is an important component of agriculture in Mozambique, especially in low rainfall zones. As an extension officer, what <i>basic elements</i> do you need to know to be able to <i>recommend</i> adequate irrigation water management by farmers?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
E16	<p>One of the principal post-harvest activities has been to demonstrate improved silos. What characteristics do you consider essential in an improved silo so as to reduce grain losses?</p> <p>a.....</p> <p>b.....</p> <p>c.....</p>	
E17	<p>Why is it that drying harvested grain is important for grain and seed conservation?</p> <p>.....</p> <p>.....</p> <p>.....</p>	
E18	<p>As an extension officer, what importance would you place on the introduction of small scale agro-processing technologies in the Family Sector (encircle a response that you consider to be higher priority)?</p> <p>1 High priority</p> <p>2 Medium priority</p> <p>3 Low priority</p>	<p>_____</p>
E19	<p style="text-align: center;"><u>Livestock Production</u></p> <p>What is the most common disease that affects the chickens in the Family Sector?</p> <p>.....</p>	<p>_____</p>
E20	<p>What are the symptoms of this disease?</p> <p>.....</p> <p>.....</p> <p>.....</p>	
E21	<p>How do you combat this disease?</p> <p>.....</p> <p>.....</p> <p>.....</p>	

E22	According to your knowledge and professional experience, what is the MOST common disease that affects goats in the localities where you work (write “NOT APPLICABLE” if there are NO goats in the localities where you work)?	_____
E23	What are the symptoms of this disease?	
E24	What is the most common disease that affects cattle?	_____
E25	What are the symptoms of this disease? 1..... 2..... 3.....	
E26	What is the second most common disease that affects cattle? Disease.....	_____
E27	What are the symptoms of this disease?	
E28	<u>Forestry Extension</u> What are the main activities relating to forestry that you have undertaken? a..... b..... c.....	
E29	Have you been involved in reforestation activities	1. Yes 2. No _____
E30	IF ANSWER TO QUESTION E29 IS YES: If you have been involved in reforestation activities what species were disseminated? (encircle all that apply)? a..... b..... c.....	_____ _____
E31	IF ANSWER TO QUESTION E29 IS YES: Where did the tree planted? (encircle one) 1. In farmers’ fields 2. Along river banks 3. In selected community areas 4. In areas of low potential for cultivation of crops 5. Other, specify.....	

F01	<p>General aspect about the Unified Extension Service (UES) and In-service Training</p> <p>Since 1998 DNER is implementing Unified Extension System (UES). How do you judge the performance of UES in pursuing holistic solutions (crop production, livestock, natural resources) of the farming systems in your personal case?</p> <ol style="list-style-type: none"> 1. Good performance 2. Satisfactory performance 3. Reasonable performance 4. Poor performance 	
F02	<p>According to the answer, list the 2 principal aspects which you perceive as undermining the performance of UES (if applicable) Note: RANK ACCORDING TO IMPORTANCE.</p> <p>1</p> <p>2</p>	
F03	<p>Based on your field experience, list 2 most important measures which can contribute to improve the performance of UES. (Rank according to importance).</p> <p>1</p> <p>2</p>	
F04	<p>In-service staff training is part of DNER priorities. How do you view the relevance (importance) of DNER training in your personal case? (Encircle one response)</p> <ol style="list-style-type: none"> 1. Is highly relevant contributing to the professional development of extension workers 2. Is relevant but is not reaching all the members of the team 3. Is reasonably relevant and is reaching all members of the team 4. Is not relevant 5. Other (specify)..... 	
F05	<p>According to the above answer, indicate 3 most important measures in order to improve training relevance according to the your personal experience. (Put according to level of importance starting from 3)</p> <p>1.:</p> <p>2.:</p> <p>3.</p>	

**THANK YOU VERY MUCH FOR YOUR TIME AND EFFORT!
 YOU HAVE PARTICIPATED IN AN EXERCISE THAT IS VERY IMPORTANT FOR
 PUBLIC EXTENSION!**

